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ORIGINAL ARTICLES.

THE EARLY PHYSICAL SIGNS OF PULMONARY TUBERCULOSIS.[1]

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WHEN discussing the early physical signs of pulmonary tuberculosis, there are several facts that should be kept in mind. In the first place, early physical signs do not necessarily mean that the disease is in an incipient stage, and in the second place it is still an open question how deep one can explore the lungs by percussion and auscultation. Many authorities hold that extensive changes can occur in the lung structure with few or no physical signs on auscultation or percussion.

It has, moreover, been frequently pointed out that no tubercle bacilli are found in the sputum until ulceration has taken place. I have found that as soon as ulceration occurs, or as soon as tubercle bacilli are found in the sputum, the chances for recovery are considerably lessened.[1] When tubercle bacilli occur in the sputum, the disease in one sense is no longer incipient. The term "incipient," in this paper, is applied to those cases with slight local and little or no constitutional involvement. It should be added that of these cases only those with a favorable prognosis are as a rule admitted to the Adirondack Cottage Sanitarium. In the 201 incipient cases discussed in this paper, tubercle bacilli occurred in the sputum of 71 (35 per cent.). One hundred and seven cases had a lesion on one side only and of these 34 (32 per cent.) had tubercle bacilli. Of the remaining 94 cases in which there were lesions on both sides, tubercle bacilli occurred in 37 (39 per cent.).

Every effort should be made to make the diagnosis before ulceration has begun, and in many cases the physical signs are of great help, but the fact should be emphasized that absence of physical signs is not conclusive proof that the lungs are normal. In many cases the diagnosis must depend upon the symptoms, and in cases with symptoms of pulmonary tuberculosis very slight changes from normal in the physical signs are of great importance. The "closed lesions" of the Germans are not rare, and the diagnosis must in many of these cases rest upon the symptoms and physical signs. In a recent case at the Adirondack Cottage Sanitarium, the patient had marked physical signs with a great quantity of sputum, yet Dr. Twichell examined twenty-six specimens on as many days before tubercle bacilli were found. They were then numerous until his death, which occurred in about three weeks. Considerable time may elapse after the onset before physical signs appear. In 192 incipient cases the time of onset was from three weeks to ten years before admission. In 111 cases (58 per cent.) the patient did not apply for admission during the first six months of his illness.

Method of Examination.—The relative value of the information obtained by the various methods employed in physical diagnosis is not fully appreciated, or at least stated by all observers. The classical method of making the examination, *i.e.*, by inspection, palpation, percussion, auscultation, mensuration and radioscopy, is often overemphasized in some details and in some cases receives too rigorous adherence. I am speaking in regard to incipient pulmonary tuberculosis only, where I have found the following method gave me on the whole the best results:

The patient should be stripped to the waist and covered with a chest cloth or blanket. He should stand, if possible, or if too weak, be seated on a revolving stool. Recently I have thought that I had obtained better results from percussion when a patient stood in a corner or near a wall, instead of in the middle of the room, on account of the reinforcement of the sound. The chest should be carefully inspected anteriorly, laterally, posteriorly and from above on quiet breathing. Palpation should next be practised, but quiet breathing only should be employed. Percussion should be made while the patient is breathing quietly. When one has finished auscultating the patient may be made to breathe deeply to determine, if necessary, whether limitation of movement is present on either side above or below. I rarely find this necessary in the cases I see, as quiet breathing usually gives me the information desired. Percussion, too, after a full breath can now be practised and the girth and index of the chest be determined, as well as the movement of the bases of the lungs by percussion and radioscopy.

INSPECTION.

The chest should be bared to the waist and the patient placed in a strong light, preferably falling diagonally across his chest. As the data obtained by inspection are closely connected with those based on mensuration, both will be discussed at this time.

General Conformity of Chest.—The general conformity of the chest in incipient pulmonary tuberculosis varies but little from the normal. A considerable number of cases have strikingly well-formed chests, better developed in many

[1] Read before the Laennec Society of the Johns Hopkins Hospital, May 25, 1904.

instances than the average healthy chest. In 83 out of 193 incipient cases the chest was well formed. In 48 cases it was not well formed; and in the remaining 62 cases some asymmetry or slight deformity was present, though the chest on the whole was fairly well formed. The chest index, the ratio of the anteroposterior diameter to the transverse diameter at the nipple level, may in health be stated to be about 75. In 157 incipient cases of pulmonary tuberculosis the index was 74, practically normal. The ratio of the length of the chest to the height in 540 males measured by Dr. Sargent at Harvard was 19.1. The same proportion in the Adirondack Cottage Sanitarium cases show 19.9, and this in spite of the fact that the heights in the latter are inclusive of shoes. The chest then in incipient pulmonary tuberculosis may be said to be longer than normal.

The Thoracic Perimeter.—The circumferences of the chest on forced inspiration and forced expiration should, it is said, be together at least equal to the height. As our cases have been measured in their shoes, 2.5 centimeters have been allowed for error in men and 3 centimeters in women. In 80 men the two circumferences exceeded the height in 44 cases (55 per cent.) and were less than the height in 36 cases (45 per cent.). In 95 women in 20 (21 per cent.) they exceeded the height, in 75 (79 per cent.) were less than the height. A striking difference between the male and female cases is seen in these figures. It suggests that the perimeter has been calculated only for the male. (In 175 cases the perimeter exceeded the height in 37 per cent., was less than the height in 63 per cent.) A number of immature chests, however, are included in these figures.

Angulus Ludovici.—The prominence of Louis' angle does not seem to be much reduced in incipient cases. The angle has not been measured by a goniometer, and its prominence may therefore be due in some cases to the pyriform exostoses of the second costal cartilages, to which Rothschild has called attention. This author thinks Louis' angle much reduced or obliterated in pulmonary tuberculosis.

The intercostal spaces vary little from normal in early cases. The intercostal angle, as measured by the eye, was normal in 33 out of 45 incipient cases and narrowed in 12.

Asymmetry.—In truly incipient pulmonary tuberculosis the chest shows little if any deformity. Before basing any conclusions on asymmetry of the chest, all previous possible causes of such deformity should be excluded; for example: occupation, pneumonia, pleurisy, etc. The earliest form of asymmetry is probably manifested by the prominence of one clavicle. Out of 169 incipient cases one clavicle was more prominent in 107 (63 per cent.) and equal in 62 (37 per cent.). Of 88 cases with a definite lesion on one side, in 45 the clavicle was prominent on the affected side, in nine prominent on the opposite side, and in 34 cases the clavicles were equal. In 156 out of 193 cases no flattening of the chest on one side was noted on inspection. In 100 cases with a lesion on one side only 19 showed some flattening, in part at least, due to atrophy of pectoral muscle, which in 12 agreed with the lesion, and in seven occurred on the opposite side. The figures would seem to indicate that the right side is normally more prominent than the left. (In 11 "right-sided lesions" with asymmetry, depression occurred on the right in five, on the left in six. In eight "left-sided lesions" seven occurred on left, one on right.)

In 95 incipient cases with a lesion on one side the diameter from the nipple to the vertebral spine on the same level was noted. This showed that in 30 cases the affected side had a smaller diameter; in 34 cases the diameters were equal, and in 31 cases the diameter was less on the unaffected side. The figures, however, seem to indicate that the right diameter is normally larger than the left, but the diameters are somewhat affected by the lesions. [In 53 cases with a lesion on the right side, the right diameter was smaller in 12 cases (23 per cent.), larger in 26 cases (49 per cent.), equal in 15 cases (28 per cent.) In 42 cases with a lesion on the left side, the left diameter was smaller in 18 cases (43 per cent.), larger in five (12 per cent.), and equal in 19 (45 per cent.)].

In 193 cases there was one case with a funnel chest, one pigeon-breasted and one phthinoid. In five cases the sternum was prominent, in ten depressed, and in one prominent above and depressed below.

Scoliosis.—Slight scoliosis was noted in 22 out of 103 cases. The convexity was to the right in twelve cases (six with a lesion on right side, six on left); in ten it was to the left (eight with a lesion on the right side and two on the left).

Varices.—Attention has been called to the occurrence of varices on the affected side. They are frequently to be noted, but do not seem to me in early cases to occur sufficiently often on one side to warrant any conclusions.

Difference in Size of Pupils.—In 181 incipient cases, 15 had a difference in the size of the pupils. Of eight cases with a lesion on one side only, six showed an enlargement of the pupil on the affected side, two on the unaffected side. Of the seven cases with both sides affected, in three the pupil was larger on the side with the more trouble, in two the pupil was larger on the less affected side, and in two both sides were equally affected, but the right pupil was larger than the left. In the fifteen cases the right pupil was larger in twelve, the left in three (one had the lesion on the left, one on right, one on both—more on right). Little information can be obtained from the difference in size of the pupils in early cases of pulmonary tuberculosis.

Larynx.—In five cases out of 197 examined, one vocal cord moved less than the other. In two cases the limitation of movement was on the

affected side, in three on the opposite. This was the only abnormality noted in the laryngeal examination in these cases, which, however, presented no laryngeal symptoms.

Movement of the Chest.—In 101 cases with a lesion on one side, the movement by inspection and palpation was restricted on the affected side in 53, on the opposite side in 24; on both sides equally in two and was equal in 21. In one case the movement on the affected side was greater but the side lagged. I have thought it would be of interest to compare the movement of the two sides, as obtained by inspection, percussion of the bases and radioscopy of the diaphragm. Twenty-two cases have been examined. In three cases inspection showed the movement equal. In 15 the movement was restricted, on the affected side in 10, on the unaffected in five. Four cases had lesions on both sides. Of the 10 cases with the movement noted by inspection as limited on the affected side, in five percussion of the bases and radioscopy of the diaphragm coincided. In eight cases of these 10 inspection and percussion showed limitations of movement on the affected side.

In seven cases radioscopy agreed with inspection. In five cases inspection showed the movement restricted on the unaffected side. In one case percussion and radioscopy coincided with it. In two of these five cases percussion and X-ray showed a restriction of movement on the affected side. In one case percussion showed no difference, while X-ray showed a limitation on the affected side. In the remaining case X-ray showed a limitation on the affected side, percussion on the unaffected side. Inspection showed no difference in movement in three cases, in two of which both percussion and X-ray indicated a limitation of movement on the affected side. The remaining case had a limitation of movement on the affected side by percussion, on the unaffected side by X-ray. From these figures it is seen that inspection showed a limitation of movement on the affected side in 55 per cent., percussion in 72 per cent. and radioscopy in 72 per cent.

For some time past I have had my attention called to the fact that when the movement was restricted at the apex it was often exaggerated at the base. This is easily made out by inspection and palpation. When the movement is equal, or nearly so, I always carefully examine the bases to see if I get more movement on the affected side. In 12 incipient cases with a lesion on one apex, I noted in nine that the movement, while restricted at the affected apex, was exaggerated at the base. In three cases the site was doubtful, but the phenomenon occurred on the side supposed to be unaffected. It was noted in five cases with lesions on both sides. I would like, however, to call attention to the fact that in all these 17 cases, the phenomenon occurred upon the right side. I have observed the same phenomenon in many advanced cases.

I regret that I have not recorded separately the relative movement of the two shoulders and would add that the observations of movement were made over the infra-clavicular fossæ and over the infra-axillary regions.

Spirometry has not yielded information of sufficient value in early pulmonary tuberculosis to encourage us to make a study of it. I cannot but believe that in some cases it may be decidedly dangerous.

PALPATION.

Palpation has seemed to me to be of little value in these cases, except as an aid in determining limitation of movement. Increased normally on the right side it is difficult to detect a slight increase of the vocal fremitus if the lesion is at the right apex. When the lesion is at the left apex the vocal fremitus may be of more value. If it is equal on both sides it is probably increased on the left. In 94 cases with a lesion on one side the palpation was normal in 64, greater on the affected side in 23, and on the unaffected in seven (six on the left side).

PERCUSSION.

In many early cases little or no information can be gained by percussion as ordinarily practised. The note is unchanged and the same on both sides. When the involvement of pulmonary tissue necessary to produce any change in the percussion note is considered the absence of dulness in the incipient stage is not to be wondered at. Cornet[2] has stated that in general to produce any change in the percussion the area of disease must have reached an extent of four to six square centimeters and a depth of two centimeters. Alison[3] held that the air capacity of the lung must be reduced one-third to produce any change in the percussion note, and one-half to produce dulness. This would explain why a small lesion can be more easily detected by percussion at the apex than elsewhere. The note obtained on percussion can in many cases be analyzed in regard to loudness, duration and pitch. In some cases the first change to be noted is a shortening of the duration, though in many cases it is already accompanied by a rise in the pitch and a diminution of the loudness. Occasionally emphysematous changes occur which mask the dulness, and even in some quite advanced cases little or no dulness can be obtained. This change is no doubt the cause of the relative slight dulness at times detected on the apparently unaffected side.

With a bared chest the patient should stand in a corner or near a wall with his arms hanging loosely by his sides and his head straight. I have found it best to begin with immediate percussion of the clavicle. Care should be taken to strike the clavicles at the same distance from the extremities and at the same angle relatively to a horizontal plane, otherwise a slight difference in note may mislead one. The remainder of the two sides is then compared and often when per-

cussing one side I find it well to go from the resonant parts below to the suspected apex.

I have recently thought that by standing behind the patient, who faces a wall, and percussing the apex I could get better results. To be more explicit, I place the palm of my hand over the suprascapular area and bend my middle finger until it lies firmly against the skin in the supraclavicular fossa. By this procedure one, so to speak, grasps the apex of the lung. Percussion is made on the distal phalangeal joint. Whether it will prove of value to others I cannot say, but it enables me to get the plessimeter finger into more nearly the same position on both sides and allows the finger to lie closely upon the part to be percussed. When examining the back I find it always of value to make the patient cross his arms, putting his hands on his opposite shoulders and bringing his elbows together. His muscles should be relaxed, his shoulders dropped and his body bent slightly forward. This is practically one of the positions recommended by Dr. Corson in 1859.

In many cases on careful percussion a slight change in note is detected at the level of the second rib. If we percuss from below upwards, at this level, the note becomes slightly higher in pitch and possibly a little shorter. I have not found this to be pathological, but have attributed it to the increased thickness of the pectorals in these areas.

The note at the right apex, especially just below the clavicle, is said to be slightly higher in pitch than that at the left. I have found this in a few cases, but in these it caused no confusion. It is well, however, to begin percussion on the left side. In left-handed patients this relative dulness is usually reversed.

In 28 cases out of 201 percussion was negative, while auscultation revealed some abnormal signs.

In 107 cases with a lesion on one side, 25 cases were normal on percussion; five exhibited slight dulness on the opposite side; and in one case the note at both apices was hyperresonant. In the remaining 76 cases the change in the percussion note occurred at the apex in 73, 37 in front, 12 behind and 24 both in front and behind. In 12 cases the change occurred only above the clavicle.

In 16 cases there were slight differences on percussion without any accompanying auscultatory signs. In three cases there were no abnormal physical signs on auscultation. In the remaining 13, auscultation revealed some change on the opposite side.

In 1889 Krönig[4] published in the *Berliner klinische Wochenschrift* a description of a new method of percussing the apices. The height of the apices above the shoulder girdle has often been discussed, and I believe that it is not generally agreed that they always rise to the same level. Krönig has applied to the apex the same method of percussion and the inductions from it that we ordinarily apply to the heart. A slight change of the position of the cardiac dulness does not mean to us what a change in the area does. Krönig marks out the part of the lung lying above the clavicle and scapula on each side and compares the size of the resonant areas. A slight change in position does not necessarily imply disease, but a contraction, a shrinking of the area of resonance on one side is very suggestive. To map out this area very light percussion should as a rule be used. When the disease becomes arrested early, vicarious emphysema has been stated to obliterate any change that had existed in this area. The supraclavicular fossa, if closely observed, is at times seen to retract during inspiration, but usually only in advanced cases. In early cases, as Senator points out, the apex of the lung usually rises slightly (about one-quarter inch) as shown by percussion. Lack of sharp definition in this area of resonance on the affected side is also a point of value.

Auld's[5] method for percussion of the resonant area above the clavicle will never, I believe, come into general use and lacks the direct simplicity of Krönig's.

Percussion I have found to be of value in determining the movement of the bases of the lungs. It has given me better results than Litten's sign, possibly because I am insufficiently practised in the latter method. I instruct the patient while standing to put his hand on the back of his neck and to raise his upper arm until it is perpendicular or as nearly so as he can make it. I explain to him what I am about to do and then determine the lower limits of the lungs in the anterior or midaxillary line on deep inspiration and full expiration. The amount of movement may increase after several deep breaths. To determine the value of this procedure I have examined 41 cases in this manner and compared the movement with that of the diaphragm as determined by radioscopy. In three cases the location of the disease was questioned and in six a lesion existed on both sides. Deducting these we have 32 cases in which the lesion was on one side only. Of these 32 cases, in 20 the movement was shown to be limited on the same side both by percussion and X-ray. In 17 cases the limitation was on the side supposed to be affected and corresponded with the other physical findings. In three cases the limitation was on the side presumably unaffected. One of these cases had marked scoliosis with the concavity on the left side, which was apparently normal but had restricted movement. The second case had only a slight pleurisy at the left infra-axillary region. The third case was that of a medical student with the lesion at the right base and possibly the left.

In 12 cases the findings by radioscopy and percussion differed. Of these the movement on percussion was equal in two, while the X-ray showed marked limitation on the affected side. In two cases the lower limits on the left could not be satisfactorily determined on account of the stomach tympany, while the X-ray showed the

diaphragmatic movement limited on the affected side. In two cases the X-ray showed the movement to be practically equal (one-fourth centimeter difference), while percussion showed the movement limited on the affected side. In one case the movement was practically equal by both X-ray and percussion (one-fourth centimeter less movement on the affected side by percussion). The breast obscured the diaphragmatic movement in one case, which percussion showed to be limited on the affected side. In the remaining four cases the results obtained by percussion were correct in two and wrong in two, in which latter the X-ray was right in regard to the side affected.

Twenty-two of these cases were incipient. Four have to be excluded, as the location of the disease was not determined in one and disease occurred on both sides in three. Of the remaining 18 cases both percussion and X-ray showed in one case a limitation of movement on the apparently normal side. In 14 cases (82 per cent.) percussion showed a limitation of movement on the affected side. In the remaining three cases percussion showed equal movement in two, both of which seemed to be deep-seated lesions. The X-ray showed limitations of movement on the affected side in all three of these cases, but failed to show it on the suspected side in four cases in which percussion demonstrated it.

From the little experience I have had with this method of determining the relative movement of the diaphragm on the two sides by percussion, I am led to believe it may prove of considerable value as one of the links in the diagnostic chain in early pulmonary tuberculosis. In cases with central lesions I think it is less useful, and in these radioscopy still seems to be our most valuable aid. How soon after meals a patient should be examined is also a point to be settled, as I can conceive that a large meal might retard the movement of the diaphragm on the left, possibly on both sides.

The X-ray examinations were made with the patient standing about 18 inches from the tube, which was on a level with the fourth costal cartilages.

A cracked pot note is occasionally obtained in incipient cases (in one out of 201), due to the elasticity of the chest. It usually occurs in the subclavicular fossa.

I have not noted in any of these incipient cases any increase of resistance to the plessimeter finger. Auscultatory percussion is not, as far as I am aware, of any assistance in very early cases. My attention has recently been called to the "Tastpercussion" of Ebstein,[6] but I have not had an opportunity to put it to the test in any of these cases.

AUSCULTATION.

There is a great temptation when dealing with incipient pulmonary tuberculosis to begin the examination with auscultation, as it undoubtedly yields the earliest and most trustworthy information. Inasmuch as the disease begins most often at the apices it is well to commence each manoeuver at one of these points.. The whole chest should be gone over with the stethoscope on quiet breathing. I find it then convenient to examine the vocal resonance, paying especial attention to the whispered voice sounds. The chest should then be examined during a full inspiration after coughing. It is often necessary to explain to the patient how to cough and how to breath to bring out well any adventitious sounds.

The differences between the two sides of the chest on auscultation have been mentioned so often that it is only necessary in this paper to recall the fact to dismiss it. It should be noted, however, that while most observers hold that the excess of natural breathing occurs on the right side, Alison,[3] from observation on about 100 boys, girls and young females, found it increased on the left in 10 and equal in the others.

The first change to be detected on auscultation, and in fact the very first abnormal physical sign in pulmonary tuberculosis, relates to the vesicular murmur. Changes may occur in the quality of this murmur, in the relative duration of its two parts (inspiration and expiration) or in its continuity and equality. The first change to be detected is often some harshness and increased loudness of the vesicular murmur. This in most cases is an increase of loudness or elevation of the expiratory murmur,—prolonged, high-pitched expiration. Grancher[6] held that the earliest change is a low, rough inspiratory murmur, which if sharply defined at one apex is very significant. Wavy breathing precedes weakened breathing, which probably occurs only when the area of infiltration has reached some size.

Vesicular Murmur.—A change in the vesicular murmur is often the only variation from normal found on auscultation. In many cases the vesicular murmur on quiet breathing is very distant or weak. However, this may be due to an improper manner of breathing and not to pathological changes. The patient should be directed to take a full deep breath and the chest should be auscultated with the naked ear as well as with the stethoscope. A series of short, quick inspirations often aid in the examination. When loss of vesicular murmur is detected at both apices the patient should be made to breathe noiselessly through his mouth. This in some cases will enable a good vesicular murmur to be heard. Some deficiency in vesicular murmur was noted in 82 cases. Of 107 cases with a lesion on one side, 39 had some loss of vesicular murmur; of 94 with a lesion on both sides in 43 there was some deficiency in vesicular murmur.

Prolongation of Expiration.—The first change to be detected by auscultation in some cases is a prolongation of the expiration, often slightly raised in pitch. In 107 incipient cases with a lesion on one side the breathing was normal in 26. In the remaining 81 cases prolonged ex-

piration was present in 29, being the only auscultatory sign in six. When lesions occurred on both sides (94 cases) prolonged expiration was present on one side in 29 cases, on both in eight.

Wavy Breathing.—Dr. Jackson[7] in 1833 first called attention to the fact that in some pulmonary diseases the vesicular murmur is not continuous, but, as Dr. Thompson[8] has called it, "wavy," an adjective since widely used to designate this change in the vesicular murmur. In some pronounced cases the breathing is not heard for a time, only to reappear and disappear several times in a single respiratory act. This has been termed cog-wheel or jerky breathing. The wavy quality occurs chiefly during inspiration, but at times may be heard in expiration. Wavy or cog-wheel breathing has not occurred often in our early cases, where the lesion is situated at the apex. Wavy breathing may be due to the forced inspirations and heard only when such are taken. Under these circumstances it has no significance. When confined to one apex, however, it is very suggestive, and a patient with it should always be looked upon with suspicion. Wavy breathing over both sides is quite frequent in nervous patients and is no indication of disease. I have frequently noted it at the base behind, especially on the left side. It was present in nine of the 201 cases, seven on the left, two on the right. In three of these cases a lesion developed later at the site of the wavy breathing.

In many cases, however, no further change has ever taken place, and the "wavy breathing" was in some cases undoubtedly a cardiorespiratory murmur. One case in particular led me astray some two years ago. A young woman, extremely nervous, was sent to Saranac Lake by her cousin, a physician. Her sister had died of pulmonary tuberculosis two or three years previously. She had few symptoms of pulmonary tuberculosis other than those attributable to her nervous condition. On the physical examination it was noted that she had marked exophthalmos, some general enlargement of the thyroid gland and a slight tremor. However, "thinking in tuberculosis," as we have been accused of doing, a marked cog-wheel respiration at the left base led me to believe she had some pulmonary trouble. Dr. Osler fortunately saw the patient and set us—I had some backing in the error—right. She had a cardiorespiratory murmur, six to the respiration, and is now well, married and happy in her "recovery" from pulmonary tuberculosis.

In 201 incipient cases wavy breathing was present at the site of the lesion in 23. In 107 of these cases with a lesion on one side wavy breathing was localized at the site of the lesion in 10. In 94 cases with a lesion on both sides, wavy breathing was present in 13 cases, usually on the less affected side (eight out of 13).

Weakened Breathing.—Weakened or distant breathing at one apex is often a very suggestive sign. It was present in 10 of our cases with a single lesion; in one it was the only abnormal auscultatory sign, and in six the only change to be detected on examination of the respiratory murmur. In 94 cases with a lesion on both sides, the breathing was distant in 10. The weakened breathing in these cases was at the site of the lesion or lesions.

Puerile and Harsh Breathing.—Puerile and harsh breathing have also been rather infrequent in our early cases. I have found puerile breathing frequently on the unaffected side in advanced cases and have come to look upon it as by no means an unfavorable sign. In a small number of incipient cases (four) harsh breathing has accompanied prolonged expiration. In 107 cases with a lesion on one side harsh breathing with some loss of vesicular murmur was present in six; puerile breathing in six. Of 94 cases with a lesion on both sides, harsh or puerile breathing was present in 28 cases. The vesicular murmur was normal in 18 of these, *i.e.* the breathing was puerile.

Vocal Resonance.—The vocal resonance often varies directly with the vocal fremitus, and like the latter is more pronounced on the right. A slight increase on the right is therefore difficult to detect. In 201 incipient cases the vocal resonance was noted as normal, *i.e.*, slightly increased on the right, in 124. In 77 cases it was increased and corresponded with the lesion in every case but one.

Râles.—It is rare in my experience to detect on quiet breathing any adventitious sounds in the lungs in incipient pulmonary tuberculosis. When râles are detected on quiet breathing I usually assume that the case is no longer in the incipient stage, and generally find my assumption to be correct on further examination. Fraenkel,[8] indeed, holds that when any râles are heard the disease is no longer in its incipiency. Râles are in most incipient cases heard only during forced inspiration following cough. They may be moist or dry. Fine and medium moist râles are the two varieties most frequently heard, although occasionally a few sonorous rhonchi may be almost the only physical sign detected.

Quite often a few râles, fine or moderately coarse, are heard after coughing in the infra-axillary region. They may persist for some months after all symptoms have disappeared, and I am not inclined to attach too much importance to them after the diagnosis has been made. Râles in the infra-axillary region were heard in 12 out of 201 incipient cases. In eight of these cases, who have been discharged, the râles had disappeared.

I have occasionally heard a few coarse, moist râles at one apex.

In 107 incipient cases with a lesion on one side the only abnormal physical sign detected in 18 cases were some râles, fine in 13 cases and moist in five. In 48 of the remaining cases râles with other physical signs were present. In two cases the only râles noted were a few rhonchi at the apex-posterior in one, and at the infra-axillary

region in the other. The following figures may enable you to get some idea of the relative frequency with which various kinds of râles have been noted. In 107 cases fine râles occurred in 43, moderately coarse in eight, coarse in one, rhonchi in two, mixed râles in 12. In 94 cases in which there was a lesion on both sides, râles occurred on one side only in 35, on both sides in 39, and in 20 no râles were detected. The relative frequency of the various râles was as follows: Fine, 40 cases; moderately coarse, four; rhonchi, one; mixed, 29.

So in 201 cases, râles were detected in 140.

Muscle Sounds.—Muscle sounds produced in deep inspiration are more frequently heard in the infra-axillary region, though they may occur at the apex behind or at the infraclavicular fossa. These sounds should be kept in mind and investigated in the deep inspiration following cough. Râles in many cases become coarser on coughing and can then be differentiated. But if the sounds occur only during the deep inspiration following cough, a correct diagnosis is more difficult. I well remember the first marked case I saw about four years ago. I thought the patient had fine râles over the entire back on the right, but later discovered that the râles were only muscle sounds.

Pleurisy.—Pleuritic friction has been of rare occurrence in our early cases, possibly because of the apical location. It was noted in only two of the 201 cases. I might say that I have often been impressed with how seldom one hears a friction rub in pulmonary tuberculosis. Even when a patient is suffering from acute pleurisy often no pleuritic friction can be made out for some time.

In regard to the local signs occurring after the tuberculin reaction in incipient cases, they are often conspicuously absent. In some cases I have noticed a few fine râles or a slight loss of vesicular murmur not detected either before or after the reaction.

A systolic murmur occurs below the clavicle more frequently in advanced than in incipient cases. I have heard it occasionally in some of our incipient cases, but it seems to be of slight importance. The heart sounds were transmitted more widely than normal over the chest in two cases.

From the consideration of these cases it is seen that the most common picture obtained by percussion and auscultation is slight dulness above the clavicle with some deficiency of vesicular murmur with or without prolonged expiration, and a few râles, usually fine, during inspiraton following cough.

Site of the Primary Lesions.—In 29 of the 201 cases which have been studied in this paper, it was impossible to determine the starting point, but in 172 cases after much deliberation the first point of attack, as indicated by the physical signs, has in all probability been determined. Of these 172 cases, in 105 the disease started on the right side, in 67 on the left. Of the 105 cases starting on the right side, 102 commenced at the apex, three at the base. Of the 102 cases with an apical origin the abnormal physical signs first appeared anteriorly in 56, posteriorly in 21. Twenty-eight cases began in the supraclavicular, five in the subclavicular fossa. The cases that started on the left side showed practically the same points of origin. In 36 cases it was impossible to decide whether the disease started above or below the clavicle.

CONCLUSIONS.

1. Absence of physical signs in the chest is no better proof that a patient has not pulmonary tuberculosis than absence of tubercle bacilli in the sputum.

2. Tubercle bacilli occurred in the sputum of only 71 (35 per cent.) of 201 incipient cases.

3. Fifty-eight per cent. of these cases did not apply for admission into the Sanitarium within the first six months of illness.

4. Auscultation is by far the most important method of physical exploration in incipient pulmonary tuberculosis. Inspection (including mensuration) and percussion seem to me of nearly equal importance. Palpation is of less value.

5. Auscultation should be practised before the patient is made to breathe deeply, as otherwise fine crepitation may be overlooked.

6. In many incipient cases little or no deformity of the chest exists. In a majority of the cases the chest is well developed, though possibly a trifle long, with a slight prominence of the clavicle on the affected side.

7. The intercostal spaces and angle as well as Louis' angle are in the majority of cases normal.

8. The movement of the chest as noted by inspection is in the majority of cases restricted on the affected side. Restriction of movement on the unaffected side is by no means uncommon.

9. Careful inspection showed a restriction of movement in 10 out of 18 cases, percussion of the bases revealed it in 13, radioscopy in 13.

10. The lower part of the affected side shows in some cases an exaggerated movement on inspection, which may be of value in certain cases.

11. The vocal fremitus was normal in two-thirds of the cases and was three times more apt to be increased on the affected than on the unaffected side.

12. Direct percussion upon the clavicle has not proved of much value in these cases.

13. Some degree of dulness may occur without change in the auscultatory signs.

14. Krönig's method of percussion is of value in the examination of incipient cases.

15. Percussion and radioscopy seem of nearly equal value in determining the movement of the base of the lung. Radioscopy has a distinct advantage in deep-seated lesions; percussion, possibly, in "pleuritic" cases.

16. In 28 out of 201 cases (13.9 per cent.) percussion was negative, while auscultation revealed some pathological signs.

17. Prolonged expiration was present in 32 per cent. (in four per cent. as the only abnormal auscultatory sign).

18. Wavy breathing was present at the site of the lesion in 11 per cent. "Wavy breathing" at the left base may be a cardiorespiratory murmur.

19. Weakened breathing at the site of the lesion was present in 10 per cent. (in one per cent. as the only abnormal auscultatory sign).

20. Puerile breathing was present in 12 per cent., harsh breathing with loss of vesicular murmur in eight per cent.

21. Some deficiency in the vesicular murmur was present in 41 per cent.

22. The vocal resonance was normal in 62 per cent., increased at the site of the lesion in 38 per cent.

23. Râles occurred in 70 per cent. The following order indicates their relative frequency: Fine, medium moist, rhonchi, mixed.

24. Pleuritic friction occurred in but two cases (one per cent.).

25. In these 201 cases the site of the primary lesion was most frequently above the clavicle, then in the suprascapular area and subclavicular fossa. Sixty-one per cent. occurred on the right side.

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ARE THE INSANE RESPONSIBLE FOR CRIMINAL ACTS?[1]

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THE prevalent use of insanity as a shield for crime, renders its medicolegal study of more than passing interest. In view, therefore, of its extreme importance and practical significance, it is somewhat surprising to find the scant attention which it has received in the published transactions of this worthy organization. Moreover, the contributions which have appeared, together with their discussions, have met with no definite mutual agreement, thus leaving the novice in psychiatry to grapple with this momentous question largely unaided by those whose experience and competence enables them to speak with authority.

As one of the younger accessions to your ranks, I trust it will therefore not be construed as presuming on my part to thus attempt to deal with a subject of such acknowledged perplexity, for my purpose is not to assume the rôle of a disgruntled critic, but rather the attitude of an interested student of practical psychiatry, inquiring after truth of those whose opportunities for clinical research and ripened experience qualifies them to impart reliable information and instruction concerning the question at issue.

Whether justified or not, it is my belief that much of the confusion which now prevails relative to medicolegal matters in courts of law, is largely due to the apparent indifference manifested by such specialized organizations as this, to furnish the general medical profession with definite specific knowledge concerning the abstruse problems of which they alone are the only recognized capable exponents. Hence, in every community where insanity becomes a plea for crime, and the question of mental responsibility is referred to the local medical profession, it is very distressing to find the wide difference of opinion that prevails between apparently equally competent medical witnesses, relative to its validity. If, however, this association has any function distinctly its own, it would seem to be the right to decide whether the insane are mentally responsible for criminal acts, and if so, what adequate disposition should be made of them, in order to meet the ends of justice.

That medical men are not agreed at the present time in reference to this matter, is very clear, but it is certainly highly desirable that a consensus of opinion be attained by no less authority than this able body of competent alienists, as to the mental conditions which ought to exonerate a criminal from punishment. In this connection, we are reminded by Judge Emery, of the Supreme Court of Maine, that the science of medicine is the oldest of sciences, that it has attracted to its ranks the best intellects of every age, that its disciples have been distinguished for their zeal, ability and untiring labor, and that in the thousand years of its existence it must have elucidated and established a vast number of truths, which its devotees should be able to state clearly, impartially and accurately in courts of law. Why, then, he asks, do our courts find medical evidence so often unsatisfactory? Lawyers, he claims, understand that medicine is not an exact science, and that the causes and course of disease of both body and mind are hidden from inspection, and often can be only surmised, but these allowances do not, to the lawyer's mind, account for all the faults of medical testimony.

The courts, according to this eminent authority, desire to know, not so much individual, as the consensus of opinion of the entire medical profession. It is assumed by the courts that in the present state of medical science, the medical profession has accepted certain conclusions as correct. Many new theories may be started, and numerous modes of treatment suggested by the few, while the great body of the medical profession refuse to sanction or adopt them. The

[1] Read before the American Psychological Association, St. Louis, Mo., June, 1904.

consensus of medical opinion is, however, what the courts desire, and not individual opinion.

Now, applying this principle to the subject of my theme, I presume no one here will deny the proposition, advanced some time ago by Dr. Mercier,[1] the noted English alienist, viz., "that very few, indeed, of the insane are wholly irresponsible," by which, he says, he means that there are very few indeed of the insane who ought never to be punished for wrongdoing or, to put it as he states, with brutal plainness, "it is, in many cases, right and just to punish an insane person for wrongdoing." This, I admit, is contrary to common belief and legal opinion, for there is a very prevalent notion abroad, which gets expressed from time to time in sentimental expressions of horror and disgust at the very idea of ever punishing an insane man, under any circumstances, or for any act of wrongdoing. It is, however, this universal belief in immunity of punishment, that constitutes the foundation for the plea of irresponsibility for crime, on the ground of insanity.

That total and complete irresponsibility of the insane is the magnetic watchword that insures good care and kind treatment to those unfortunates confined in our State and private insane hospitals, is undoubtedly true, and the theory in itself is a most excellent one when used in its proper sphere, or strict relation, for, as Dr. Wherry[2] aptly states: "It alone has aroused the sympathy of all God's people, for this most unfortunate class, it alone has broken the shackles from a thousand maniacs chained in dungeon cells, it alone has reached out its charitable hand and protected the wards of the State, beside ringing the death-knell of brutality in hospitals for the insane, and giving us kindness, gentleness and brotherly love instead."

Admitting all this, yea, even more; it is nevertheless, according to the writer, a false doctrine, and cannot in fact be substantiated by practical clinical experience with the insane. For the good it has already done, and is still doing, it is well to allow its influence to reign supreme in hospitals for the insane, but it should never be held in courts of law, as the true and correct criterion or standard for justice, in all cases of insanity, as it is contrary to all the facts and evidence furnished by practical clinical psychiatry.

It is at this point, however, where law and medicine come in conflict, both by authority and teaching, for the majesty of the law, as it now stands, declares that no insane person is responsible for his acts, indeed, in a strictly legal sense, there is no such thing as an insane criminal. Concede the insanity of the accused, and he is at once placed outside the ban of law, and not under its punishment. This theory of total and complete irresponsibility of the insane, therefore, corresponds to that form recognized by lawyers as legal insanity, in contradistinction to medical insanity.

The fallacy of this view, however, was ably set forth by Dr. Bancroft[3] in his essay on "Legal and Medical Insanity," which he read to this association in the year 1900. In this he clearly demonstrates how imperfectly insanity is understood by the lawyer as well as the general medical practitioner, and emphasizes the need of a definite consensus of opinion by those most competent to judge relative to its misleading character, both for its educational as well as humanitarian purpose.

To the legal mind, any act in the insane, which in the sane would be criminal, lacks every element of crime. The act is impelled, from this standpoint, by an insane impulse or delusion, which cannot be resisted or controlled; hence it is not the result of any criminal intent. A sane man, however, who has committed a crime, may become insane either before or after conviction for the crime, but the moment this occurs, he is no longer a criminal, but an insane man, and thus free from legal punishment. It would seem, therefore, that Dr. Mercier's claim, viz., that the insane should be punished for wrongdoing, is an open violation of the common law of both England and America. He, however, qualifies this statement by adding that "No insane person ought, for any act, to be punished with the same severity as a sane person ought to be punished for the same act," and he also says "that every institution for the insane is conducted in accordance with this great principle."

That insanity carries with it a certain immunity from punishment all will agree, and there are good sound scientific reasons why this is true, but every alienist of wide experience recognizes that there are degrees of responsibility associated with insanity, and that the majority of the insane should be held responsible for many of their misdeeds, and consequently incur some form of penalty or punishment. That this is the actual consensus of medical opinion by those most competent to judge, is clear, for the principle of petty punishment is practised in every hospital for the insane of my acquaintance. Every medical officer of our State and private insane hospitals realizes that many of the patients in his institution often commit misdemeanors deliberately, wilfully, and with malice aforethought, beside knowing right from wrong, and with full understanding of the nature, character, and even consequences of their misdeed. Hence, we find the insane subject to mild forms of punishment, according to the nature of their offence, such as not allowing them to attend the weekly dance, on account of fighting, or refusing the privilege of their parole, after an attempt to elope, or if caught pilfering, cutting off the weekly allowance of tobacco, or if abusive to the medical officer, removal from a convalescent to a more disturbed ward.

These and many other similar penalties are imposed upon the inmates in every well-managed

institution, not simply to maintain discipline, but also as a penalty for misconduct, and while the term "punishment" may be objected to, as having the sound of harshness, yet whether these inflictions be considered merely the withdrawal of certain privileges, or as precautionary measures, and not true punishments, in order that this ruling may be valid, the penalties imposed must be permanently enforced. As a matter of fact, however, the withdrawal of the privilege is not permanent, but only temporary, and subject to the same construction as that which applies to the sane man when he is sent to prison. There are, therefore, simply differences of degree and not of kind, and consequently equivalent to mild or severe forms of punishment.

In order to prove that the insane possess powerful control over their conduct, Dr. Mercier mentions the fact that in those patients whom he allowed "pocket money" the prospect of having this stopped restrained them from practises of mischievousness, destruction and other evil habits. Under no circumstances, however, we are informed, has the superintendent of a hospital the lawful right to punish in any way an insane person, because legally such persons are not responsible. It is surprising, however, in many criminal cases where insanity is used as a plea to exonerate crime, how the various members of the medical profession, as well as the public, insist upon punishment as being the only remedy for justice, even when the evidence favors the view of undoubted insanity of the accused. The same spirit incited the late Dr. Hammond, when placed on the witness stand in the celebrated trial of Guiteau, who assassinated President Garfield. When asked for his professional opinion, Dr. Hammond is said to have exclaimed, "He is insane, but hang him." According to law, we are told that under no circumstances have we the lawful right to punish an insane person, yet Guiteau was hung.

Not long since, in the city where I reside, there occurred two atrocious murders. In both, the plea of insanity was urged as a defence for the crime. In one it was proven that the prisoner, a young married man, was an epileptic, having had characteristic periodic attacks since childhood, up to the time of the murder. The crime was a most brutal one, and associated with all the damnable elements which are peculiar to epileptic homicidal mania. Upon being called to examine the prisoner by the defence, and having had him under observation during his confinement in the jail, I did not hesitate to pronounce him insane, the epilepsy being accompanied with pronounced religious delusions. The marked difference of opinion, however, that prevailed between the medical men, and the high state of public prejudice against the accused, as well as the result of the trial, which ended in the man paying the death penalty on the gallows, is the responsible cause of my appearing before you to-day, as it at once created a desire to be set right, if my views were not in keeping with modern medical thought and practical clinical psychiatry.

In order that you may further understand my purpose, the following brief editorial, taken from one of our daily papers, speaks for itself:

Taylor Case Verdict.—"The attorneys for Bud Taylor have the satisfaction of knowing that they did all they could to save their client from the consequences of his crime, and the public has the satisfaction of knowing that the deliberate ambushing and slaying of a young woman of the community without just cause or provocation, is to meet the punishment it deserves—if the verdict of the criminal court shall stand. The defense made out a strong case from its viewpoint. Epilepsy as an excuse for murder saved one man from the gallows a couple of years ago in this city, but it was unsuccessfully evoked in the present case. Only one man of the twelve voted for insanity, and his convictions were not very pronounced.

In some respects the trial was one of the most remarkable in the criminal history of Jackson County. Not the least interesting feature of the proceedings was the unusual array of medical experts put upon the stand on both sides, and the wide divergence of their opinions. At times this divergence bordered on the humorous, if the matter under consideration had not been of so serious a character. How eminent physicians, graduates of the same school of medicine, could arrive at two entirely opposite conclusions from the same given set of facts is one of those strange things with which this world abounds. If books and clinics and observation and experience, the sum total of knowledge used by the physician in practising his profession, teach anything, they should teach substantially the same thing all the time. Making due allowance for the difference in personality, temperament, physical condition and all that, the effect of the same cause must generally be of the same nature in all. Even expert testimony cannot overturn the law of induction. Between this bewildering conflict of evidence, the jury evidently took the only view which comports with common, every-day sense, and that was that a man who showed sufficient sanity to plan and carry out a murder with the intelligence and deliberation shown by Taylor in the killing of Ruth Nollard, was not suffering from a form of insanity which should give him immunity from punishment for his foul crime. The jury evidently thought that Taylor's fits didn't last three days, while he lay at his window with his rifle trained on the street, waiting for his victim, whose offense was that she had refused his unwelcome attentions."—*K. C. Journal.*

The second case was that of a young married woman who shot her husband, and as he fell to the ground mortally wounded, kicked him in the face and spat upon him, all because, as her relatives alleged, he had betrayed her as a lover and refused to support her as a husband, after

a forced marriage. The plea of insanity was used as a defence for the crime. Being called by the defense to examine the woman, and having visited her several times at the jail, it was my opinion that she was not insane, even at the time when she committed the deed, and so testified. The result of the trial ended in her being sentenced to ten years in the penitentiary.

Her lawyers, however, took an appeal, and a new trial was granted by the Supreme Court of Missouri. In the mean time she married again, while her father and brothers were arrested and charged as being accessories to the crime. One of the boys was found guilty and sentenced to serve two years in the penitentiary. In the second trial the woman was acquitted, but not before her brother had served his term of imprisonment. By her acquittal the jury practically said that a crime, taken in its legal acceptance, was never committed; hence her brother had actually served a term in the Missouri penitentiary for a crime that was never legally committed. Is he therefore to be considered a legal convict? And how was it possible for him to assist in the commission of a crime that never, in law, happened? This is a question that, so far, has not been answered.

In 1901 Dr. A. B. Richardson,[4] of the Government Hospital, Washington, delivered an address to this association on the subject of "Graduated Responsibility," in which he maintained that graduated responsibility before the law was not only advisable, but necessary, and that judges and jurors as well as legislators should strive to vary the penalties imposed not only to meet the degree of the criminal act, but also to fit the indidual himself.

That some of the insane are wholly irresponsible for their misdeeds, and justly demand complete immunity from all forms of punishment, all will agree. Moreover, it cannot successfully be denied that a very large number, perhaps the majority of the insane, are, to some extent at least, responsible for much of their misconduct. If, therefore, we can, as a profession, adopt the truth implied in these two propositions originally set forth by Dr. Mercier, viz., (1) the total immunity of some insane offenders for some acts, and (2) the mitigation of punishment in more or less degree, for all crimes done by insane offenders, we shall not only have taken a great step in advance, but also formulated a more just and equable medicolegal standard for this class of miscreants. The practical importance of securing a consensus of medical opinion regarding these important questions, is therefore obvious, as at present we have no absolute guide or standard of authority to which we can refer.

If, as we are informed, our courts of law desire to know not so much individual as the consensus of medical opinion by those most competent to judge concerning medicolegal questions, who, I ask, has a better right to furnish the solution of these problems than this worthy organization? Unless we are agreed, how can we expect our courts to deal justly with such offenders? In an able article by Dr. C. W. Hitchcock,[5] of Detroit, Mich., on "Mental Responsibility," which he read at the annual meeting of this association in 1900, he states "That he ventures to hope that his desire for the establishment of some sort of standard to which such cases as he reported shall be made to conform, or by which they may be measured, or which at least may serve as a guide as well as for the purpose of comparison, is not entirely utopian or chimerical." Moreover, we should endeavor to set forth what mental conditions should exonerate the insane offender from all form of punishment.

Wherry, in his able article, claims that "the most reliable and efficient test for responsibility when insanity is pleaded as a defense to crime is this: 'Is the crime charged the product and direct result of the insanity alleged?'" "This," he states, "requires that the insanity shall first be proven, but does not indicate that the establishment of insanity necessarily carries with it a condition of irresponsibility." "If the alleged insanity is proven to be associated with a vicious nature, if the crime charged is the product and direct result of hatred or malevolence or evil passions or wicked desires, then the act is vicious in its nature, and vice should never be vindicated simply because disease has given it undue prominence." A man is not responsible for his insanity, but is responsible for his vice. If, on the other hand, conscientious insanity be established, *i.e.*, if the prisoner be the victim of delusions or hallucinations, if his processes of reasoning be imperfect and misleading, though starting from correct premises, or perfect and logical, but based on premises which are untrue, if while drawing conclusions as best he can according to his light, the light becomes a flickering, wavering will-o'-the-wisp that leads him into devious ways where saner men would never go; if he uses the judgment disease has spared in an effort to do what to him seems right, even though it leads to a bottomless pit, then is he not only insane, but honestly and conscientiously so. A man who yields to the dictates of desire is vicious, whether he be insane or not; but a man who acts in response to the dictates of a diseased judgment is conscientious whether he be insane or not. The insane may therefore be divided into two classes—those dominated by desire and those dominated by diseased judgment. The former constitute the vicious insane, the latter conscientious. The one is responsible, the other irresponsible.

According to Dr. F. McDonald,[6] of New York, the real test of responsibility is not a knowledge of right or wrong with reference to the particular act; but, knowing the right and knowing the wrong, has the man the power to choose the right and avoid the wrong? It is therefore not a question of knowledge, but the power to choose between two courses of action.

If he has not such power, then his act is the product of his disease, and he is not responsible. There is, therefore, no legal test of insanity. Every case must be decided on its own merits, but the basic facts are that insanity is a mental disease, and the product of mental disease cannot be a crime.

In conclusion, it would seem highly desirable that this association take some definite action in formulating certain deductions to which we can all agree relative to the mental responsibility of the insane, and thus tend to overcome the prevailing misconception concerning insanity, Such a course would also furnish a reliable guide by which the interests of both law and medicine could justly be subserved, when insanity becomes associated with crime. If these imperfect remarks could serve the means of such a happy consummation, their purpose will have fulfilled their highest mission.

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ON THE MECHANISM OF EXOPHTHALMOS.

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We are still so far from comprehending the nature of exophthalmic goiter that light upon it from any side may be welcome. It has seemed probable that the study of the individual symptoms might be of value in this respect, and we have attempted to determine experimentally the mechanism of the exophthalmos. Since, however, it is after all impossible to be sure that the exophthalmos which one may produce experimentally is the same as that seen in this enigmatical disease, we have contented ourselves, for the time being, with the study of the phenomenon produced in animals by disturbance of the circulation or by the stimulation of the cervical sympathetic, being well aware that although many surgeons hold that exophthalmic goiter is the expression of the continual stimulation of the cervical sympathetic, we are by no means possessed of conclusive proof that this is so.

It is hardly expedient to enter here into a discussion of the nature of all the variety of exophthalmos. Those forms which result from hemorrhage into the orbit, from emphysema of the orbital tissues, from exostoses, tumors or cysts either in the orbit or in adjacent parts of the cranial cavity, from inflammation of the orbital tissues or neighboring tissues, etc., require no special explanation. Nor are we directly concerned with the various forms of pulsating exophthalmos due to arteriovenous communications, aneurisms, etc. In the absence of such definite and obvious causes there still remain to be explained a great many cases among which those associated with exophthalmic goiter are prominent. The greatest variety of explanations, sometimes resting upon experimental work, has been proposed, and these may perhaps be reviewed briefly. These explanations rest either upon vascular alterations or muscular changes.

In especial favor is the idea that if from any cause the venous channels in the retrobulbar spaces become overfilled and dilated an adequate cause of exophthalmos is at hand. This is the basis of the explanation of those cases of pulsating exophthalmos in which arteriovenous communications exists, as may be shown by anatomical investigation (Eales, Schlaefke). Similarly in those cases in which there is thrombosis of the cavernous sinus, there may be an extraordinary protrusion of the eyeball, and this is explained by Eales as due to pressure paralysis of the third, fourth, fifth, and sixth cranial nerves. In those cases, however, as was exemplified recently in the Johns Hopkins Hospital, the protrusion of the eye is associated with the most extreme edema of all the tissues drained by the ophthalmic vein, so that it seems more probable that the exophthalmos is largely due to the edematous swelling of the retrobulbar tissues, although in part directly to the enlargement of the veins.

It has been held by some authors that the widening of the retrobulbar veins, and hence the exophthalmos, is due to vasomotor paralysis (Sattler, Buschan, Matthiesen, Ferri), by others that it is due to active vasodilatation (Schmidt, Rimpler, Ehrich, Rieger and von Forster). Still others ascribe it to the chronic passive congestion resulting from any compression of the veins or obstruction to the return of the blood to the heart. Diseases of the lungs, cervical tumors, bronchocele and the like (Nunneley, Taylor), intrabulbar hyperemia (Eulenberg and Guttmann) and even edema of the membrane of Descemet (Pauli) have been adduced as causes of the protrusion.

Most of these opinions are merely *opinions* and not based on any definite anatomical or physiological observations, but there has also been some experimental work along the same line.

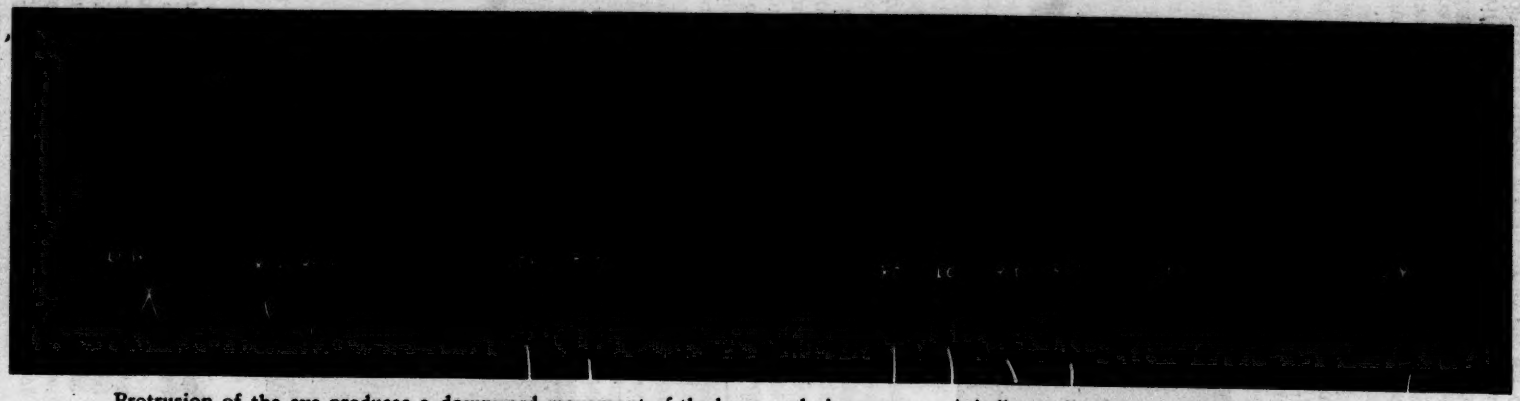
Boddaert, for example, experimented with rabbits with the following results:

1. Section of the cervical sympathetic with ligature of the external jugular on the same side gave exophthalmos on that side lasting a few days.

2. Simple ligation of the external jugular gave only transitory results.

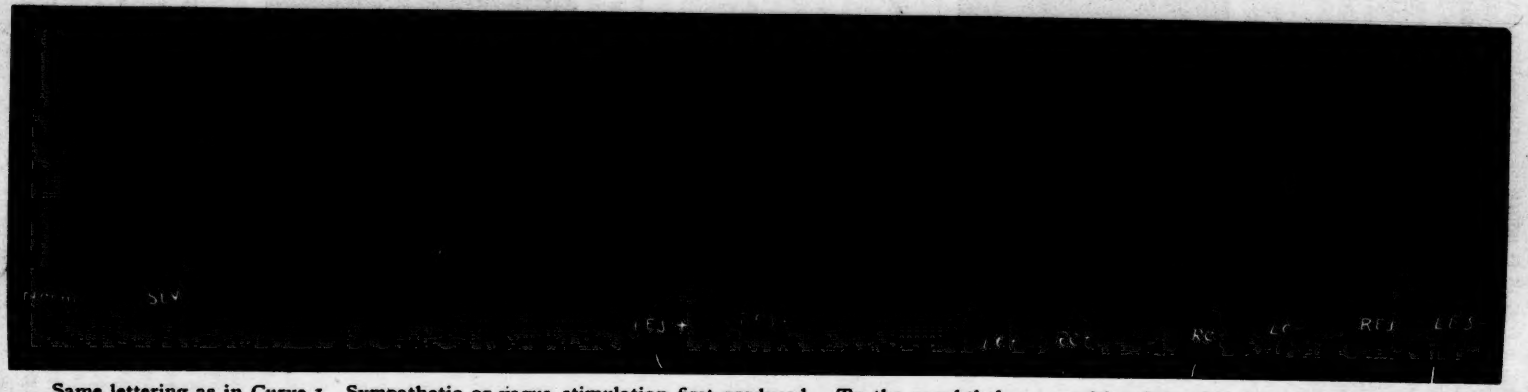
3. The first procedure plus section of the cer-

Chart 1.



Protrusion of the eye produces a downward movement of the lever, and vice versa. + indicates ligation or clamping of the vessel. — indicates the release of the clamp or ligature. R I J, R E J, L E J. Right internal, right external and left external jugular. L C and R C. Left and right carotid. S V. Stimulation of cervical sympathetic, which in the dog is united with the vagus. The sympathetic stimulation was carried out after the eye had returned nearly to its normal position.

Chart 2.



Same lettering as in Curve 1. Sympathetic or vagus stimulation first produced. To the exophthalmos resulting from this there are later added the effects of ligation of the veins.

vical sympathetic on the other side gave double exophthalmos, but more marked on the side on which the vein was ligated, lasting three to four days.

4. Tying both external jugulars gave exophthalmos lasting a few days.

5. In such animal compression of the common carotids caused a recession of the eye, but when the cervical sympathetics were cut this was very slight.

6. Double ligation of the jugulars with double sympathetic section gave exophthalmos lasting ten to fifteeen days and even in traces for two months.

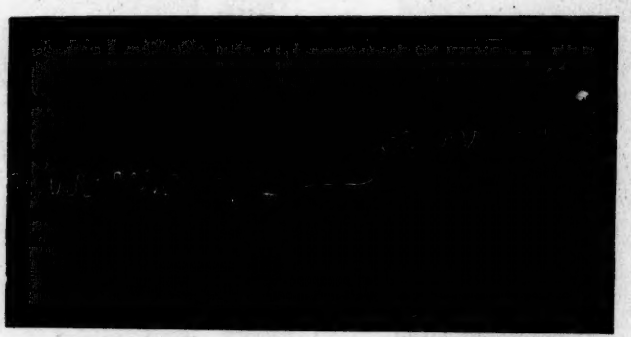
He thought that the orbital muscle is paralyzed by section of the sympathetic, and a retraction of the bulb follows. Probably edema of the retrobulbar tissue causes protrusion secondary to the hypervascularization.

Stilling and Vulpian were able to produce the same changes, but thought that such an experiment could throw but little light upon the exophthalmos of Basedow's disease.

We have repeated some of these experiments with certain variations, and have endeavored to control the results accurately by the use of an apparatus consisting of a lever working about a pivot and recording the movements of the eye on a revolving drum. Such an apparatus was easily constructed of two straws attached at right angles by means of a metal part about which the whole swung on a pivot, the head of the animal being fixed in such a position that the axis of the orbit was vertical. One end of this lever rested vertically upon the cornea, being held in place by a hollow foot of wax, while the end of the other branch, armed with a paper point, traced the curve upon a vertical revolving drum.

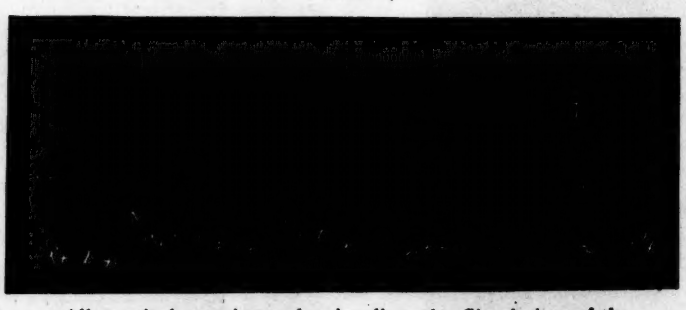
Curves drawn with this instrument show respiratory waves, as well as waves which correspond with the pulsation of the heart. It is therefore seen that the position of the eye is slightly modified by both these factors. If now the jugular veins and carotid arteries be separately clamped, very definite changes in the position of the eye occur as are well shown in the curve. Briefly the results may be stated as follows: Ligation or closure of the internal jugular vein on either or both sides produces little or no effect. Closure of the external jugular on the side upon which the eye is being observed produces a marked exophthalmos, which is greatly increased

Chart 3.



Shows marked respiratory and pulse waves. During the application of the stimulus to the sympathetic, which produces the protrusion here marked by a rise in the curve, the respiration is suspended.

Chart 4.



All cervical arteries and veins ligated. Simulation of the sympathetic still produces exophthalmos.

by the subsequent clamping of the external jugular on the opposite side. Closure of the carotid arteries now produces a diminution of the protrusion, which returns, however, to its maximum when they are again released. Finally the release of the external jugular veins allows the eye to sink back to its normal position. All of these phenomena occur, as may be seen in the curve, practically instantaneously. The absolute protrusion in one dog from which we obtained the curves which we reproduce here, when calculated in millimeters, was 3.2 mm. (Charts I and II.)

From this experiment it will be seen that the degree of protrusion produced thus by suddenly clamping the jugular veins is considerable, but would doubtlessly yield after a time to the establishment of a collateral channel of outflow for the blood. If the jugular be left ligated, however, a great edema of the face and eyelids associates itself with the distention of the veins and only gradually disappears. This edema, which apparently involves also the retrobulbar tissue, seems to aid greatly in the protrusion of the eye, and we have thought it an important factor in those cases in which the cavernous sinuses are thrombosed. (Chart III.)

Now it is well known that without any mechanical interference with the circulation of the neck and head one may, by stimulating the cervical sympathetic nerves by means of a current from an induction coil, produce a great exophthalmos (Chart III). Associated with this protrusion there is a retraction of the eyelids and a maximal dilatation of the pupils. Whether there is any alteration in the size of the vessels about the eye and in the retrobulbar space, we could not determine by inspection, but our impression was that there was no definite change. Dr. Randolph was kind enough to observe the retinæ of these dogs with the ophthalmoscope while the sympathetic trunk was being stimulated, but could not make out any alteration in the size of the retinal vessels.

Neverthless the idea that this exophthalmos is due to the distention of the retrobulbar vessels is so deeply rooted that other experiments were made to control these results. (Chart IV.)

In one dog both carotids were tied and the cervical sympathetic stimulated. Quite the same curve was produced as in the dog with the intact vessels. In another dog both common carotids, both vertebral arteries, and the jugular veins were tied (Chart IV). A slight protrusion resulted from the ligation of the veins, which was first performed, but after that the stimulation of the cervical sympathetic trunk produced such a great additional protrusion that there seemed no doubt that its action was independent of the circulation. Finally a dog's head was completely severed from the body and allowed to drain of its blood. Stimulation of the sympathetic now produced exophthalmos quite as marked as in any of the other dogs.

We conclude, therefore, that that form of protrusion of the eyeball which results from stimulation of the cervical sympathetic is entirely independent of the changes in the blood supply. What, then, we may ask, is the mechanism of the process?

Numerous theories as to the action of the muscles have been put forward to explain the protrusion. On the one hand relaxation of the eye muscles and other supports of the eye (Cooper), fatty degeneration and atony of the eye muscles (Traube, Recklinghausen, Bristowe), toxic atony of eye muscles (Lemke), have been held accountable. Fürst, however, quotes a case of ophthalmoplegia to prove that, contrary to Lemke's statement, weakening of the eye muscles produces, if anything, enophthalmos. On the other hand, spastic conditions of the eye muscles (Brüke), overaction of the oblique muscles where the recti are paralyzed (Salomonsohn), have been thought to produce the same effect.

Finally, Sappey, Wagner, and others have thought the protrusion due to the contraction of the so-called musculus orbitalis of Müller. Müller in 1859 described the smooth muscle of the eyelids and also this cone of smooth muscle and elastic fibrous tissue which surounds the eye and by its contraction keeps it forward. Wagner, who attempted in vain to produce exophthalmos in the head of a decapitated woman by stimulating the sympathetic, does not think that the muscle is sufficiently developed in man to have such an action. Th. Harling described in detail the antagonistic action of the muscle to that of the voluntary muscle of the eye; from its funnel shape and its anterior attachments it keeps the eyeball pressed forward. Since, as Müller stated, it is innervated by the cervical sympathetic, the explanation of the exophthalmos may be reached in a simple way. In man, however, he thinks its function chiefly protective. Sappey in 1868 reported a dissection showing that in man the protrusion of the eyeball after stimulation of the cervical sympathetic is due to the existence of smooth muscle fibers which form part of the orbital aponeurosis which constitutes a true fibromuscular sheath. The muscle forms a contractile cuff of conical form, the apex being posterior, so that by its contraction the eye is pressed forward.

We have studied this structure in man and in the dog, and find that, as these authors state, it is far better developed in the dog, where it forms a smooth conical mantle about the eye, continuous anteriorly with the musculature of the lids and forming abundant attachments about the margin of the orbit, passing backward thence, to end about the foramen through which the optic nerve enters the orbit. Nevertheless, this muscular tissue is by no means wanting in man. Here, too, it is continuous with the smooth muscle of the eyelids, and is continued backward in the membrane which lies immediately outside of the bulb (capsule of Tenon).

Anatomically everything seems, therefore, to

point to the possibility that protrusion of the eye might be produced by the contraction of such a muscle.

We have also endeavored to ascertain the extent of the participation of this smooth muscle cone in the production of exophthalmos by direct observation. The top and side of the orbit were removed in a dog and the bulb thus laid bare and freed from surrounding fat. The cervical sympathetic was then stimulated, and we could see a distinct peristaltic wave pass backward throughout the length of this cone, pressing the eyeball forward into the position seen in exophthalmos. Allowing the muscle a few miutes for rest, this could be repeated several times. We then cut with scissors around the middle of this membrane-like cone so as to completely sever the anterior from the posterior half. Stimulation now produced a contraction of the posterior or small end of the cone, which retracted out of sight into the optic foramen, while the eyeball remained stationary.

The simple conclusion for these experiments seems to be that on stimulating the cervical sympathetic nerve the ocular protrusion which results is not due to vascular changes, but to the peristaltic contraction of the cone of the musculus orbitalis which presses the eye forward.

We have, through the courtesy of the surgical staff of the Johns Hopkins Hospital, been able to observe two cases in which, in human beings, stimulation of the cervical sympathetic trunk just below the superior cervical ganglion was carried out. In neither was there any visible exophthalmos, although in both the pupils became greatly dilated on that side. Jonnesco reports, however, the production of exophthalmos in human beings by the use of a strong current in stimulating the sympathetic. (XIII. Cong. Internat. de Méd., Paris, 1900.)

We were further interested to determine whether or not we might produce exophthalmos without pupillary dilatation by stimulating some other part of the sympathtic system. In other words, whether we might find some point at which stimulation would not produce both these phenomena. We therefore traced the sympathetic cord back into the thorax in a cat under artificial respiration, and found that the requisite impulses were produced along a path which could be traced into the second ramus communicans, *i.e.*, into the second ventral root in the dorsal region, but here stimulation produced both exophthalmos and pupillary dilatation, and in spite of the most painstaking exploration of the dorsal and cervical cord, the floor of the fourth ventricle, and the aqueduct, we were unable to find the point we searched for, nor even to produce either of these phenomena from these higher centers. Further search, however, may reveal such a point. Similarly our efforts to produce exophthalmos by stimulating nerves going to or from the thyroid were futile.

In view of the objection which has been raised to the idea that continual stimulation of the sympathetic might form the basis of the exophthalmos in Basedow's disease, we kept up a mild stimulation of the sympathetic in dogs for periods of eight and ten hours, and found that the exophthalmos persisted fairly well all day. A gradually if slightly increasing stimulus seemed, however, to be necessary to maintain the degree of protrusion obtained at first.

We may conclude then that

1. Obstruction to the outflow of blood from the veins of the orbit produces at once exophthalmos, which is relieved by the establishment of a collateral circulation. This process, however, is completed so slowly that in the meantime the orbital tissues as well as the tisue of the face become very edematous, thus adding to the exophthalmos.

2. Entirely independent of any circulatory changes is the exophthalmos produced directly by the stimulation of the cervical sympathetic nerve. This protrusion is due to the peristaltic contraction of the orbital muscle.

From these experiments we can draw no certain conclusions as to the mechanism of the exophthalmos in Graves' disease, but the possibilities are perhaps more closely defined.

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Hartford Hospital Gets $500,000.—It was learned on October 3, that by the will of Miss Maria Terry, who died at Venice a month ago, the Hartford Hospital will receive approximately $500,000. A director of the hospital, when asked to confirm the report, said that the institution had been remembered by Miss Terry, and he thought the bequest would amount to about half a million dollars.

SOME NOTES ON A CASE OF ERYTHROMELALGIA; WITH TREATMENT.

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THE points in the case about to be described, while not in themselves especially remarkable, may nevertheless prove of some interest as illustrating the peculiar conditions met with in this distressing disease.

At the time of onset the patient was a woman of fifty-seven years, and the mother of three children who are still alive and well. She came of a family in which alcoholic or other indulgence was practically unknown. Her father died of apoplexy, and for many years her mother suffered with nephritis, which terminated fatally when she was in her fiftieth year. A brother died of carcinoma of the inferior maxillary, and a sister of a complication of diseases. It is interesting to note that no history of mental or nervous trouble was obtainable on the side of either father or mother. The patient had the common diseases of childhood, save diphtheria and scarlet fever. At twelve years she had a severe attack of acute articular rheumatism, with an associated pericarditis, but recovered completely and never had a recurrence.

Her first child was born when she was twenty-three years old; it was a forceps delivery and she is said to have had a very "hard time." Then neuralgia of the trigeminus set in and continued for twelve years, being of so severe a type that she was confined to bed for three days in every week. The second child was born four years after the first; the labor was fairly easy and recovery uneventful. The third child was born ten years after the second, when the patient was thirty-seven years old, previous to which all neuralgia had ceased spontaneously. There was never any further pain in the head. Menstruation began at fourteen; it was difficult at first and compelled the patient to leave boarding school; after it became established it was always regular in appearance, duration and quality until her forty-seventh year, when the menopause took place.

The onset of the disease in question took place in 1899. At that time the patient experienced sharp and severe pain in the great digit of the right foot, which, in her own language, resembled very closely the sting of a bee. There was, from the first, extreme sensitiveness to touch, and it was at times impossible to keep a stocking on the foot. The pain was worse at midday, and usually reached its height when the patient came to the dinner table, gradually lessening during the afternoon, and allowing her to sleep fairly well at night. Inspection showed some swelling of the entire toe; the skin on the dorsum was pale and had a varnished look, while on the plantar aspect there was a mottled appearance not unlike that of frost bite. The toe was exquisitely sensitive, and so hot that an ice-cloth, when it was possible to apply it, would dry so perfectly within ten minutes that it gave the appearance of being starched. The patient was obliged to walk on the heel. These observations were made during the first month.

It should be emphasized at this point that throughout the most distressing and uncontrollable condition was the pain. By September, 1899, this symptom had greatly increased, both in frequency and severity, but was not worse at any particular part of the day. It began to interfere with sleep, and was less easily governed by cold; occasionally, hot cloths seemed to give greater relief. The symptoms from this time on were somewhat masked by the use of morphine, which had to be resorted to in the absence of relief from any other drug.

On November 1 the patient went to the Presbyterian Hospital in New York, where she was seen by Dr. M. Allen Starr, who made the diagnosis. She was put on potassium iodide, 20 grains, three times a day; the leg was slightly elevated in a comfortable position, and a bed-rest made to keep the covering free from contact with the feet. In two weeks she became dissatisfied and went to her home in the country, where the same treatment was continued.

Local examination revealed the same condition as was described above, with extension to the ball of the foot. Upon being questioned she admitted the presence of some slight pain in the great toe of the left foot, but regarded it as unimportant. Electricity proved that degeneration was rather advanced in both feet, but in the right more than in the left. At this time the patient walked about the room on her right heel, or traveled about with the right knee on a small chair which she pushed along. She soon took to bed, however, and remained there several months.

The heart was moderately hypertrophied, but about in its normal position; occasionally it skipped a beat, or perhaps two or three beats, and then would become irregular, beating faster and faster till it finally slowed down to normal. No organic murmurs were discoverable. The pulse was strong, fairly regular, slow, full and of increased tension. The radial artery was thickened, but compressible; lungs, normal. Loss of memory was becoming noticeable to the patient, and was marked even to the casual observer. She had always possessed a very good memory. Sight and hearing were good. Reflexes were slightly diminished. There were no twitchings, and no peripheral disturbances, save in the diseased region. Symptoms in the alimentary tract were probably due to morphinism; the mouth was dry; tongue, furred; appetite, lost; digestion, imperfect, with formation of a great deal of gas which was pased *per orem*.

The desire for morphine now became irresistible at exactly the same hour each day, and was evidenced by a very abundant watery secretion from the nose, by the belchings of large quanti-

ties of gas, a "gone" feeling in the stomach, and heart weakness. If unrelieved, collapse symptoms became imminent; but an eighth of morphine caused immediate disappearance of all these effects in from twenty to thirty minutes. It is necessary to state, however, that at no time did the amount of morphine administered exceed five-eighths of a grain in twenty-four hours, and the average was about three-eighths. The bowels moved daily, resort to cathartics or enemata being necessary only a half dozen times during the entire illness of four years and nine months.

In the winter of 1900 the symptoms were most marked, and the severity of the disease process may be said to have reached the high-water mark. Examination showed that all the toes of the right foot were involved, and had a peculiar purplish tinge on the plantar aspect, while the dorsal aspect looked pale and shiny. The nails also had a purplish appearance with a dull waxy luster. The ball of the foot had a mottled purplish color, which was most prominent over the first metatarsophalangeal articulation. In the hollow of the foot there were several reddish patches, irregular in shape, reminding one of a spatter of red ink, and varying in size from a ten-cent piece to a quarter. The sides of the dorsum of the foot also had three or four patches, but as remarked before, they were not present on the dorsa of the toes. There were four or five spots on the posterior aspect of the leg, and one or two on the thigh, but none were situated on the anterior aspect. These spots were darker in color than those on the foot, and had the appearance of an old contusion of the skin, being partly yellowish or bluish.

Very soon the pain left the right foot, and the symptoms it had presented began to disappear. The swelling of the toes subsided, the spots disappeared, desquamation took place, and there was the look of new nails growing out from the old matrices. The same improvement took place in the left; all acute symptoms subsided, and the patient passed into a condition of comparative comfort. Numbness and "queer" feelings continued for about a year, during which the patient enjoyed good health and regained complete use of her limbs which had atrophied from disuse. There was never the slightest evidence of bony deformity.

In February, 1903, she experienced unpleasant sensations in her back and legs. There were chilly feelings which soon developed into actual chills, coming on every morning on getting out of bed, and lasting for an hour or more. Stiffness and soreness in the joints soon followed, and one month later severe pain began in the hallux of the left foot. The left knee became stiff and sore, but there was no limitation of either active or passive motion, save the discomfort of the operation. There was also considerable pain in the left hip which lasted for one month and then subsided. The fear of gangrene, which was at one time entertained proved to be a groundless one, for this condition never developed. In June the patient began to be confined to bed, and suffered for four months all the tortures that accompanied the progress of the disease through her right side; the sequence of involvement, appearance on examination, and subsidence, being precisely the same.

The symptomatic treatment of this condition may be said to have been a total failure, since nothing stopped the progress of the disease, and even morphine finally failed to control the pain. Such local applications as the much-vaunted antiphlogistine were intolerable, and had to be washed off immediately after application, giving the patient much additional pain in the process. The iodide of potassium alleviated the condition for a time, but had to be stopped because of its severe action on the stomach. Nitro-glycerin was tried, but was soon abandoned. In securing relief, two conditions were to be met: First, to control the pain; second, to control the craving for morphine. The patient was really starving because she could neither take nor digest food suitable for the maintenance of life, even broths, peptonized milk, and light custard being rejected. As an experiment we began to use fluid extract of ergot in 30 minim doses, three times a day, gradually increasing to a dram dose. Within ten days the pain began to lessen, and the dosage was reduced until the drug was no longer necessary.

At the same time it was deemed advisable to give some preparation of strychnine, since this drug is a synergist of ergot, tones up the nervous system, acts directly on the digestive apparatus, and is somewhat antagonistic to morphine. Accordingly, one-thirtieth grain of the sulphate of strychnine was given three times a day, as this seemed the most convenient form of administration. The morphinism was treated by gradually cutting down the dosage and administering an equivalent amount of dionin and peronin, using each a week at a time, entirely without the patient's knowledge, of course. At the end of three weeks the appetite had returned completely, the morphine habit was broken, and the drug discontinued. No other treatment was henceforth employed, save good substantial food and the continuation of the strychnine for two weeks longer.

For three months the patient gained in strength. She got out of bed, and recovered complete use of her limbs without the interposition of any symptom previously manifest. During this time there was thickness and indistinctness of speech, with amnesic aphasia and agraphia. At times the patient seemed dazed and unable to answer simple questions directly; she was perfectly conscious of her surroundings, however, and called each member of the family by name. There was apparently complete loss of memory for persons and objects which she had not seen for an interval of ten years. Within this limit the memory was fairly good. The

mouth was somewhat drawn down toward the right side, but there was no motor paralysis elsewhere; she had perfect control of the arms and hands. Occasionally, the fingers felt numb, and the nose would itch and become quite red, but no pain could be elicited. The patient's disposition became entirely changed, she was mild, gentle, never lost her temper, and was inclined to be optimistic. These points were especially noticeable to members of her family. On December 27 she was seized with violent coughing and choking at the dinner table, and upon examination was found to have had a typical apoplectic seizure, from which she died within twenty-two hours. It is greatly to be regretted that no autopsy was obtainable.

The points to be emphasized in this case are: (1) The acute onset; (2) the severe pain; (3) the gradual progress; (4) the long periods of intermission. Looked at in perspective it is doubtful if the treatment finally employed had as much influence on the disease as was at first thought from the rapid subsidence of the symptoms, as she had had two previous intervals of freedom from pain. Since other cases reported in the literature differ in so many respects from this, there is certainly no specific remedy available.

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A FACTOR IN THE CAUSATION OF EMACIATION IN TUBERCULOSIS OF THE LUNGS.[1]

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It is a well known truth that emaciation is more characteristic of tuberculosis than of any other disease. In fact the words phthisis and consumption derive their origin from this one symptom.

But very little investigation has been undertaken to explain this emaciation. Some authors ascribe it to an increased metabolism "inseparable from the febrile process." Others claim that it is due to a specific toxin which increases the catabolic activities of the cells.

To investigate the relation of digestive activity to emaciation in tuberculosis, the experiments about to be enumerated were made.

An attempt was made to ascertain the activities of the digestive glands of patients suffering from tuberculosis of the lungs by comparing them with the activity of the digestive glands of normal persons and the glands of patients suffering with malignant disease.

As it was almost impossible to obtain the gastric juice from a sufficient number of patients, it was necessary to take a secretion which could easily be obtained. So the saliva was determined upon as the medium for investigation.

[1] The writer is indebted to a number of gentlemen for their encouragement and assistance. He is under especial obligations to Dr. Wm. J. Gies, Dr. Ira S. Wile, the Resident Physician at Seton Hospital, and Dr. G. Alfred Lawrence, of the Skin and Cancer Hospital.

The saliva is an excellent secretion for experiments of this kind. In impaired digestion, it shows less change than the gastric or pancreatic secretions. Therefore, there is all the more reason for believing that a pathological state of this fluid is of the utmost importance as an indication of a change in the system. Those pathological changes which have been found to exist in the saliva have usually been specific changes due to some extraneous substance and not to an altered state of the secretion, *per se*. Among the extraneous substances might be mentioned potassium iodide, urea, bile salts, etc. On the other hand Fenwick claims "that the sulphocyanide of the saliva is a measure of the functional activity of the nutritive organs, and that it is increased in general whenever an unusual demand is made on them by the necessities of the system, provided these organs are capable of responding to the call, as in the early stages of acute inflammation, of cancer, phthisis, etc. The quantity is diminished in all conditions where the nutritive organs are unable to supply the requirements of the system, as in the later stages of phthisis and malignant disease."—(Von Jaksch, Clinical Diagnosis).

One may ask what defense may be sought in using the saliva as an indication of the activity of the other secretions of the alimentary canal. In the first place, the general tendency is for the whole gastro-intestinal canal to be more or less affected when one individual portion suffers. For example, there is an excessive secretion of saliva in pyrosis and a diminution in the amount of secretion in fevers. The fact is well established that in any pathological condition of the stomach or intestines, the rest of the alimentary canal is likewise in an altered condition, either organically or functionally. This may be explained in one or two ways. Either the specific function of the *whole* canal is for digestion and assimilation of food or else the various nervous centers of digestion in the central nervous system and in the sympathetic ganglia are so associated and correlated, that one centre exercises an influence over the others.

The saliva may be taken as an indication of the secretory activity of the whole gastro-intestinal canal for the following reasons:

1. The saliva shows less change in impaired digestion than the other secretory fluids of the gastro-intestinal canal.

2. In some diseases of the gastro-intestinal canal, the saliva undergoes a pathological change.

3. The centers for the secretory apparatus are so intimately connected in the nervous system, that one set of organs is governed reflexively by the condition of the others.

Accepting the saliva as an indicator of the glandular activity of the gastro-intestinal canal, the following experiments can then bear considerable weight on partially determining the cause of emaciation in tuberculosis of the lungs.

One objection may be raised. In the experi-

ments, the tubercle bacillus would invariably be found in the saliva. Now is it not possible that the presence of the bacillus in the secretion may be of some import? This point may be dealt with summarily. The saliva as found in the mouth, is so full of bacteria, yeasts, fungi, etc., often the tubercle bacillus itself being present, that it can hardly be asserted that this one species of bacteria can have any influence on the starch digesting power of the saliva.

The writer's technic carried out in the experiments was as follows:

Method of Collecting the Saliva.—The saliva from the tuberculous patients and the healthy individuals was collected in the forenoon; the saliva from patients with malignant disease was obtained in the afternoon. Each patient was supplied with an ordinary elastic band which was sterilized by boiling. This was chewed upon for ten minutes or until 10 c.c. of saliva was secured. The saliva was expectorated into a clean cup and from this was poured into a two ounce bottle containing a little thymol. The specimen thus collected could be kept indefinitely. The bottle was tightly corked and stowed away for a few days for subsequent examination.

At the time of the experiment, the saliva was filtered. Six c.c. of the filtrate was poured into a two ounce bottle. This was diluted up to 60 c.c. with distilled water, thus making a 10 per cent. salivary solution. The specimen was then ready for use.

Method of Procedure for Determination of Amylolytic Power.—It was found that the best method was that of titrating the digested fluid into a known strength of Fehling solution, used according to the method of Pavy.

Solution 1. 79.28 grams of crystals of copper sulphate are thoroughly triturated and added to 800 c.c. of distilled water. After the salt is dissolved, the solution is brought up to 1,000 c.c. with distilled water.

Solution 2. 346 grams of sodium potassium tartrate are dissolved in 400 c.c. of distilled water and 250 grams of potassium hydroxide in 400 c.c. of distilled water. The two are combined and distilled water is added up to one liter. In the experiments equal parts of 1 and 2 were used.

Test of the Reducible Power of the Fehling Solution.—Ten cubic centimeters of the mixed solution here used was titrated against 2.5622 grams of thoroughly dried glucose, dissolved in 100 c.c. of distilled water. It was found that .0538062 grams of sugar reduced 10 c.c. of the solution.

Pavy Modification of Fehling's Test.—Pavy's modification throughout the experiments, consisted in making an ammoniacal copper sulphate solution as follows:

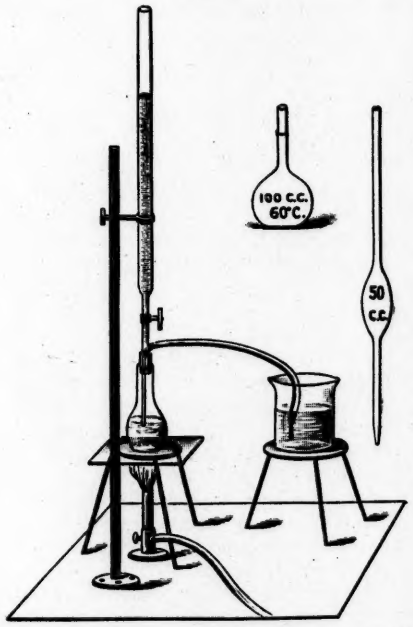
30 c.c. of Fehling No. 1.
30 c.c. of Fehling No. 2.
150 c.c. of 10 per cent. ammonium hydroxide..
290 c.c. of distilled water.
500 c.c. of the Pavy solution.

The solution was made up fresh every day, 50 c.c. of Pavy solution being used for each titration. It will thus be seen that 6 c.c. of Fehling solution was used each time.

The Pavy modification has many advantages in accuracy over the ordinary Fehling test. In the first place, the copper sulphate is in a more dilute solution. Secondly, the color change is in the solution and no precipitate is formed. Thirdly, the blue changes to a colorless solution. And fourthly, no oxidation from the air can possibly take place as the ammonia vapor occupies the space above the fluid when used in the apparatus about to be described.

Description of Apparatus.—A flask of 300 c.c. capacity is placed upon a tripod over a Bunsen burner, wire gauze serving as a protection from the flame. A 50 c.c. burette, graduated in tenths,

Fig. 1.



Apparatus used for titrating according to the Pavy method.

is connected with this flask by means of rubber and glass tubing, passing through a closely fitting two-holed stopper. Upon another tripod is a beaker containing distilled water. A short piece of glass tubing passes through the second hole of the stopper and is connected with a piece of rubber tubing whose free end is closed by a short glass rod and which is put into the beaker. Just above the closed portion of the tube, a small linear opening is made to allow the ammonia to run through the water. Fig. 1 represents in a crude way the apparatus used.

Preparation of the Digested Fluid.—Powdered arrowroot starch was taken as the material for digestion. This was finely powdered and exactly

one gram was weighed out and then poured into a graduate 100 c.c. flask in which 90 c.c. of distilled water had been measured as follows: 100 c.c. of distilled water was poured in up to the mark on the neck of the flask and then 10 c.c. withdrawn by means of a pipette. When the starch had been added, the solution was thoroughly shaken and heated to boiling, being constantly stirred so as to make a starch paste. The paste was then poured back into the flask and allowed to cool at room temperature.

As was noted before, the saliva had been made up in a 10 per cent. solution. To the starch paste was now added enough saliva solution to fill the graduated flask, thus one per cent. of saliva being used. This new solution was then thoroughly shaken and immediately transferred to an incubator at 100.4 to 104° F. and allowed to digest for exactly one-half hour. At the expiration of this period, the solution was quickly transferred to a beaker and boiled thoroughly so as to inhibit the action of the enzyme. One can now wait a few days before titrating for the amount of sugar.

Estimation of the Amylolytic Power of the Saliva.—The burette is thoroughly rinsed with a little of the digested solution. 50 c.c. of the Pavy solution is placed in the flask. The burette is filled with the digested mixture, which must not be used in a warm condition. The rubber and glass tubings, having been connected to the burette, the digested fluid is permitted to flow from the burette until a few drops escape from the lower end of the glass tubing. The stopper with its two glass tubes is now firmly inserted into the flask. The fluid in the flask is heated to boiling and the digested mixture is allowed to flow in to the Pavy solution, drop by drop until the blue color has entirely disappeared. The reading from the bottom of the meniscus having been previously ascertained, a second reading is taken in the same way and the result calculated by finding the difference between the two.

Five titrations of the same solution were made in each case and an average of the closely agreeing readings taken as approximately accurate.

Calculation of the Amount of Sugar.—The calculation of the amount of sugar was reckoned by the number of cubic centimeters of the digested fluid used. For example, 21.3 c.c. of solution being used, the amount of glucose equals 152 mmg. reckoned as follows:

10 c.c. Fehling reduces .0538062 grams of sugar.
6 c.c. Fehling (the amount used) reduces .0323 grams of sugar.
21.3 c.c. equals .0323 grams sugar.
1 c.c. equals .0015217 grams sugar.
100 c.c. of solution (1 gram starch) equals 152 mmg. glucose.

The amount of maltose is easily reckoned from this. Ordinarily 10 c.c. of Fehling reduces .0778 grams of maltose when 10 c.c. of the same Fehling will reduce .05 c.c. of glucose. So .0778:.05::x:.0538062 or 10 c.c. of the Fehling used reduces .083722447 grams of maltose.

Then glucose:maltose::1:1.556. Therefore, multiplying the milligrams of glucose by the factor 1.556 will give the milligrams of maltose.

Method of Testing the Alkalinity.—Ten c.c. of the 10 per cent. filtered saliva was used. Congo red and lachmoid were the indicators. There was practically no difference in results when an average of five titrations was made. The ordinary titration apparatus (burette, etc.), was used, the titration being made with hydrochloric acid of a known strength. The results were read in tenths of a gram and then transposed into milligrams. Each cubic centimeter of acid neutralized .0025 grams of NH_3, whence each c.c. of hydrochloric acid equalled .00502 grams of sodium carbonate, which was taken as the constant alkaline medium in saliva. The results were ascertained as follows:

1 c.c. HCl = .0028 grams N.
N = 14 H = 3
Therefore .0034 NH_3 = 1 c.c. HCl.
$NH_3 + HCl = NH_4Cl$
17 36.5
Therefore 17:36.5:: .0034:x
X = .0073 grams HCl in 1 c.c.
$Na_2CO_3 + HCl = 2NaCl + H_2O + CO_2$
106 73
Therefore 106:73::x:.0073 grams.
And each cubic centimeter HCl = .00502 grams Na_2CO_3.

For example, 10 c.c. of saliva neutralized .5 c.c. HCl. So 1 c.c. of saliva equaled .05 c.c. of HCl. The number of mmgs. of ammonia would equal

TABLE I.

Saliva from Patients with Tuberculosis of the Lungs.

Patients.	Reduction of 6 c.c. Fehling by 1 per cent. saliva.	Mmgs. glucose from 1 gram of starch digested by 1 c.c. of saliva.	Mmgs. maltose from 1 gram of starch digested by 1 c.c. of saliva.	Alkalinity of the saliva in terms of HCl. 1 c.c. of HCl = .00727 grams of NH_3.	Mmgs. of alkaline salts in terms of NH_3.	Mmgs. of alkaline salts in terms of Na_2CO_3.
A[1]	21.3	152	236.51	50.	·170	.251
B	16.86	192	298.75	37.5	·129	.188
C	11.2	289	449.7	37.5	·129	.188
D	13.8	234	354.1	25.	·085	.1255
E	12.3	263	409.2	30.	·102	.1506
F	11.8	274	426.1	30.	·102	.1506
G	13.2	245	381.2	25.	·085	.1255
H	15.6	207	322.	25.	·085	.1255
I	14.2	227	353.2	27.5	·0935	.138
J	15.1	214	322.9	27.5	·0935	.138
K	12.3	263	409.2	30.	·102	.1506
L	14.9	217	337.6	30.	·102	.1506
M	16.	202	314.3	47.	·1598	.236
N	11.8	274	426.1	26.	·0884	.1305
O	11.7	274 3	427.8	20.	·068	.1
P	14.	231	359.4	27.5	·0935	.138
Q	19.3	167	259.8	40.	·136	.2
R[1]	20.4	157	244.2	60.	·204	.3
S	14.	231	259.4	25.	·085	.1255
T[1]	22.	147	228.7	30.	·102	.1506

1 Patients in the early stage of the disease.

.00037 grams of HCl which would equal .00251 grams, in terms of sodium carbonate.

The Saliva from Tuberculous Patients.—Table I shows in tabular form the results of twenty individual cases examined. The physical characteristics of the saliva showed it to be thicker than normal in consistency and usually darker in color. It often contained shreds of mucus and foreign material. After filtration and dilution, the physical characteristics were practically those of the normal.

It will be noted that the amount of maltose obtained varied between 228.7 mmg. and 449.7 mmg. with 1 gram of starch digested by 1 c.c. of saliva. The average digestive power for the twenty cases was 15 c.c. of digested fluid reducing the 6 c.c. of Fehling solution contained in the 50 c.c. of Pavy solution. Cases A, R and T were patients in the early stage of the disease. Here the digestive power was *less* than in the other case.[1]

The cause of the apparent contradiction to what might be expected, is not easily determined. Yet many suppositions might be brought forth to account for the fact (that the digestion is better in the advanced cases), which appear to lead in the right direction. In the first place, cases A, R and T were patients at the Vanderbilt Clinic and at the Roosevelt Hospital Out-patient Department. The other seventeen were quartered at the Seton Hospital where consumptives find a home. The former were patients who were walking about, receiving little care, other than what the Clinic could give, probably exerting energy at the expense of their tissues. The latter were in bed, under good medical supervision and nursing, and on a well regulated diet.

Another factor may explain this point. The former class of patients were probably suffering from the overwhelming effects of some toxic agent (toxin?). The secretory cells of the digestive system had to suffer with the rest of the body. It is a well known fact that the body may adjust itself to a certain extent to a certain pathological condition. No doubt that was what happened in the latter class of patients. The toxic agent either had become less poisonous in its action or else enough antagonism had been brought to bear by the body to allow the physiological functions of the organism to tend toward the normal. This exactly accords with the expressed opinion that the emaciation is less in the chronic cases than in the acute cases or at the beginning of the disease, when the body finds itself in the position of a gateless barrier into which the antagonistic bacteria are throwing forth their deadliest weapons. But the barrier becomes better fortified by having to withstand repeated onslaughts until the poisonous weapons, in some directions at least, have lost a part of their deadliness.

1 The fact must be borne in mind that the less digestive mixture used, the better is the digestion, as it takes a less amount of the digested solution to equalize the 50 c.c. of the Pavy solution.

The writer has spoken about some toxic agent. What this poison, which seems to permeate the system, is, we are at the present time unable to say. As fever was present in all these twenty cases, it is highly probable that this had something to do with the impaired digestion. (The digestion was impaired as will be shown later on.) This factor of fever may also explain to a great degree the cause of the more greatly impaired digestion in the cases A, R and T; for in any fever, any active bodily exercise, lack of rest, and lack of proper attention to the digestive organs will produce an impairment of the activity of these organs. Whether fever is due to some toxic agent, either in tuberculosis or in any other disease, remains for the future years to discover.

TABLE II.

Chittenden and Richard's Table or Normal Saliva.

	Time.	Mmgs. maltose	ALKALINITY as Na$_2$CO$_3$	ALKALINITY as Mmgs. H_2SO_4 to neutralize 1 grm. of saliva
R	Before Breakfast.....	523.4	0.173	0.83
	After Breakfast.....	511.8	0.127	0.61
M	Before Breakfast.....	585.0	0.117	0.56
	After Breakfast.....	468.6	0.102	0.49

Investigating the alkalinity of this saliva, it was ascertained that 20-60 mmgs. of HCl were required to exactly neutralize 1 c.c. of saliva. This alkalinity is rather higher than normal, the average here being 40 mmg. A fact of considerable importance will be noted, that the alkalinity is greatest where the digestion is most impaired, as for example Case A where the milligrams of maltose were 236.51 and the alkalinity 50 mmg. of HCl needed to neutralize the fluid and O where

TABLE III.

Saliva from Ten Healthy Persons.

Patients.	Reduction of 6 c.c. Fehling by 1 per cent. saliva.	Mmgs. glucose from 1 gram of starch digested by 1 c.c. of saliva.	Mmgs. maltose from 1 gram of starch digested by 1 c.c. of saliva.	Alkalinity of the saliva in terms of HCl—.00727 grams of NH$_3$.	Mmgs. of alkaline salts in terms of NH$_3$.	Mmgs. of alkaline salts in terms of NaHCO$_3$.
A	10.4	311	483.91	20.	.068	.1000
B	9.7	333	517.15	35.	.119	.1757
C	11.0	290	451.24	17.5	.0595	.08785
D[1]	10.9	296	460.58	20.	.068	.1004
E[2]	11.2	289	449.7	15.	.051	.0755
F[2]	11.1	290	451.24	17.5	.0595	.08785
G	11.2	289	449.7	25.	.085	.1255
H	10.5	308	479.2	17.5	.0935	.13805
I	10.8	299	465.2	27.5	.0595	.08786
J[3]	13.2	245	381.2	20.	.068	.1004

1 Child of twelve years.
2 After smoking.
3 *Cf.* Table I.

the milligrams of maltose were 425.8 and the alkalinity 20 measured in terms of HCl. But there was considerable variation as is shown by Case C where the milligrams of maltose were as high as 449.7 and the alkalinity 37.5 in terms of HCl.

The digestion being better where the solution approaches the normal, entirely accords with the views of Chittenden and Smith (Yale College Studies, Vol. I) and Hammarsten (Physiological Chemistry) as to the action of normal saliva. "From a number of experiments by Chittenden and Richards (*American Journal of Physiology*, Vol. I), it is seen that the variations in amylolytic power are not dependent upon the amount of alkaline salts; but that, more likely, the alkaline salts are increased where there is a greater degree of amylolysis, showing a higher degree of concentration of the enzyme" (Hays, MEDICAL NEWS, Vol. 84).

But there are enormous degrees of varieties both in amylolysis and alkalinity. For example, the amylolytic power is greater before breakfast than after the morning meal. This is confirmed by the observations of Chittenden and Richards and is shown in Table II. "It would appear that saliva secreted after a period of glandular inactivity, as before breakfast, is ordinarily possessed of greater amylolytic power than the secretion obtained after eating. Before and after dinner, however, the difference in amylolytic power is less pronounced; a fact which might be expected of the short period of recuperation between the breakfast and dinner and because of the more or less constant stimulation of the salivary glands during the waking hours."

But even if we take these factors into consideration, it must still be admitted that in the cases referred to, the digestion *was* impaired, as may be noted by reference to Table III of normal saliva; and also that the alkalinity was a great deal higher than normal.

Amylolytic Power and Alkalinity of the Saliva from Ten Healthy Persons.—The amylolysis in this set of experiments, was ascertained with the same precautions. The digestion was between 381.2 and 517 mmgs. of maltose, the average being 10.6 c.c. of digested fluid to react to the 6 c.c. of Fehling contained in the 50 c.c. of Pavy solution. The most impaired digestion was in Case J where 13.2 c.c. of digested fluid were used to react to the Fehling. The writer was not surprised at this as the person from whom the saliva was taken, looked as if he might be in the incipient stage of tuberculosis and was actually used as a test case. The best digestion in this series was in Case B who was a good healthy person. Case D was a child of twelve years who was taken to meet all exceptions and Case F's saliva was taken after smoking for the same reason.

It will be seen that the average amylolysis in the tuberculous cases was 1.4 c.c. of digested fluid above that of the normal set, measured in terms of the amount of digested fluid needed to equalize the 6 c.c. of Fehling solution and that over 100 mmgs. less maltose was thus obtained in the former set of cases, showing a decided diminution in digestion and in the activity of the secretory cells in the tuberculous patients.

The alkalinity in this normal series varied between 15 and 35 mmgs. of HCl, the average being 25 mmgs. Comparing this with the tuberculous cases, it is again to be noted that the average alkalinity is only one-half as great. But Case B shows the best digestion and yet the saliva was the most alkaline. It can only be taken as one of those exceptions that proves the rule. No doubt there was a greater concentration of the enzyme ptyalin than in the other healthy persons, which was proportionately equal to the excess of alkaline salts and not in an inverse ratio to it.

TABLE IV.

Saliva from Five Patients with Malignant Tumors.

Patients.	Reduction of 6 c.c. Fehling by 1 per cent. saliva.	Mmgs. glucose from 1 gram. of starch by 1 c.c. of saliva.	Mmgs. maltose from 1 gram of starch digested by 1 c.c. of saliva.	Alkalinity of the saliva in terms of HCl. 1 c.c. of HCl=.00727 grams of NH3.	Mmgs. of alkaline salts in terms of NH3.	Mmgs. of alkaline salts in terms of Na_2CO_3.
A[1]	9.	359	558.6	20.	.068	.1004
B[2]	8.9	363	564.83	15.	.051	.0753
C[3]	9.1	355	553.48	17.5	.0595	.08785
D[4]	9.2	351	547.16	25.	.085	.1255
E[5]	9.5	340	529.04	17.5	.0595	.08785

1 Epithelioma of the nose, twenty years duration.
2 Epithelioma of the lip, fifteen years duration.
3 Epithelioma of the lip, twenty-five years duration.
4 Recurrent carcinoma of breast, one year duration.
5 Carcinoma of breast, nine months duration.

But even if we take these factors into consideration, it must still be admitted that in the cases referred to, the digestion *was* impaired, as may be noted by reference to Table III of normal saliva; and also that the alkalinity was a great deal higher than normal.

TABLE V.

Comparison of the Averages and Extremes in Digestion in the Three Series of Cases.

SERIES.	AMYLOLYSIS.		ALKALINITY.	
	EXTREMES.	AVERAGE.	EXTREMES	AVERAGE.
	In terms of mmgs. maltose.	C c. of digested solution to equalize 6 c c Fehling	Alkalinity of saliva in terms of mmgs. HCl. 1 c c. HCl=.00727 grms. NH_3.	
1. Tuberculous.	228—449	15.	20–60	40
2. Normal	381—517	10.6	15–35	25
3. Tumor cases.	529—564	9.12	15–25	20

The less the amount of digested fluid used in titration, the greater is the percentage of sugar.

Amylolytic Power and Alkalinity of Saliva from Five Patients with Malignant Tumors.—For the matter of comparison, these five cases were taken where there was some cachexia but not as great an emaciation as in the case of tuberculosis. All the patients were the subjects of well-marked malignant disease. This is explained in Table IV. The first three cases were

under X-ray treatment, the fourth had a recurrent carcinoma of the breast which was to be operated upon and the fifth was in the Skin and Cancer Hospital awaiting operation.

The writer was prepared to meet with the same results as in the tuberculous cases, but great was his surprise to find that the digestion was *better* than normal. In this present paper it is not his duty to discuss this fact.

The amylolytic power varied between 529 and 564 mmgs. of maltose, the average being 9.12 c.c. of digested fluid needed to equalize the 6 c.c. of Fehling solution. The best digestion was in B where the saliva contained some admixture of blood which came from inflamed gums. It is seen that the alkalinity in this case was 15 mmgs. in terms of HCl and, considering that the blood contains alkaline salts, it may be assumed that the alkalinity of the saliva itself was even less than this. This again conforms with the statement that salivary digestion is better when the solution is nearly neutral.

The alkalinity of the saliva of these patients suffering from malignant disease varied between 15 and 25 mmgs. of HCl neutralized, the average being 20 mmgs.

Comparison of results in the Three Series of Cases.—Table V shows the extremes and averages both in amylolysis in the tuberculous and normal cases and in the cases of malignant disease. Comparison of the amylolysis in terms of maltose, shows that the degree of digestion in the tuberculous cases is far less than in the other two. In fact we see that there is a difference in the lowest extremes of 153 mmgs. of maltose, comparing the result with the normal; and a difference of 301 mmgs. of maltose, comparing it with the last set of cases. The best digestion in the tuberculous cases was only 68 mmgs. greater than in the lowest of the normal cases; and it must be remembered that this low normal case was already commented upon (Case J, Table III) a few pages before. Taking the next lowest normal, we find it to be 449.7 mmgs. of maltose, *which exactly equals the best digestion* in the first set of cases.

Taking the average digestion in terms of the number of cubic centimeters of digested fluid needed to equalize the 6 c.c. of Fehling in the 50 c.c. of Pavy solution, the result is noted that the digestion in the tuberculous cases is 15 c.c. against 10.6 c.c. in the normal, showing a digestion of one-half again as much in the latter set of cases.

A comparison of Series 1 and 2 with Series 3 shows a still more astonishing result. The variations in amylolysis in the tumor cases was comparatively slight, being between 529 and 564 mmgs. of maltose. Even the lowest set of figures was higher than normal and therefore much higher than in the tuberculous cases. The differences between the lowest figures in Series 1 and 2 is 148 to 47 mmgs. of maltose. And the difference between Series 1 and 3 is 301 to 115 mmgs. of maltose. But even this digestion in the last set of cases is not too high for normal as is shown by comparison with Table II. And considering that the class of persons in Series 2 and 3 were different, but the same in Series 1 and 3, the discrepancy may thus be partially accounted for. Taking note of the average in terms of the amount of digested fluid used to equalize the Fehling solution, we find 9.12 c.c. against 15 c.c., the digestion being over one-half again as good in the tumor cases as in the tuberculous cases and almost one-tenth better than in the normal cases.

A comparison of the relative alkalinity is now in order. In Series 1, the extremes were 20-60 mmgs. in terms of HCl neutralized, the highest being 25 mmgs. above the highest in Series 2 and 35 mmgs. above the highest in Series 3. The least alkalinity did not approach the neutral point by 5 mmgs. to what it did in Series 2 and 3, showing that even taking the extremes, the tuberculous saliva was more alkaline than the saliva in the other two sets of cases. Taking the average, we find the alkalinity one and one-third times as great in the first as in the second series and twice as great as in the third series. This again agrees with the assertion that the salivary digestion is better where the saliva tends toward the neutral.

Conclusion.—We have definitely proved that the saliva of patients suffering from tuberculosis of the lungs is greatly impaired in digestive power. The salivary digestion being impaired, the question now arises as to the condition of the secretions of the rest of the gastro-intestinal canal. It seems to the writer perfectly feasible to take the salivary digestion as an index of the activity of the other glands of the gastro-intestinal canal (as stated before), first because the secretory centers of the whole digestive system are so closely associated, and secondly because a pathological state of the saliva means a profound alteration of the digestive system.

In accounting for the cause of this impairment in digestion we can but theorize. The presence of a specific toxin in tuberculosis has not yet been proved to exist. And yet the alteration in metabolism in this disease appears to be due to the effects of some toxic agent which is either the specific toxin of tuberculosis or else is the result of the febrile process. As was noted before, all the tuberculous cases examined had some fever. There was no fever present in the individuals in the last two series. Is it not possible then, for the diminution in digestive power to be due to the presence of this febrile process since we know that in fevers in general there is an alteration in the digestive mechanism?

The statement has been made to the writer that patients suffering from tuberculosis are fed frequently and in great quantities and that these same patients appear to be able to absorb and

assimilate all the food given them. Can this be possible if the digestive juices are impaired? It certainly is possible if we assume that it is the quality and not the quantity of digestive secretion which has suffered in tuberculosis. If the glands, by constant stimulation from an increased diet are capable of secreting an extra amount of fluid, digestion can then be accomplished to meet the varying needs of an increased metabolism. But one of two things must happen under these circumstances. Either the digestive system must wear out under the increased toil or the body must accustom itself to the increased labor. If absorption and assimilation of food does take place under the increased feeding in tuberculosis, it is probable that the digestive system of the patient accustoms itself to the increased toil and secretes more fluid but fluid of a poorer quality.

The question has been asked "If the variations in normal saliva are so great and the excursions so extreme, how is it possible to make a just comparison?" The experiments enumerated invalidate this point, for it is shown, even taking the extremes into due consideration, that the salivary digestion in tuberculous cases is diminished.

Noting the alkalinity, we find it greater than in the normal cases, but still the same rule holding true that the digestion is better when the saliva approaches the neutral point.[1]

Turning to the cases in Series 3, we find the digestion is better than normal. As emaciation is often present in these cases, it must certainly be due to some other cause. It has been claimed that the emaciation in malignant disease (other than in the intestinal canal) is only present when ulceration takes place, and then is probably the result of micro-organisms which elaborate some toxic agent. As none of these was an ulcerative case, this point is negatived. Why the digestion was better than in the normal cases, it is not our present purpose to attempt to explain.

As digestion is impaired in these tuberculous patients, the explanation of the loss of flesh and strength is comparatively simple. Digestion being less, assimilation of food is more difficult. The metabolic activities of the body are altered and the organism has to draw on its own supply of fats, carbohydrates and proteids. In the more chronic cases, the organism has accustomed itself to the altered condition, and so the digestion is better than in the early cases.

1 It has been proposed that if there is a toxin generated by the tubercle bacillus, it may have the direct influence in inciting a greater alkalinity in the tissues, thus making the saliva more alkaline, and, in the same way, decreasing the free HCl of the gastric juice. If this theory be true, the blood also would contain more alkaline salts and therefore be capable of eliminating more products of increased tissue metabolism. Carrying this theory still further, the other tissue cells would suffer as well—the muscles in activity would be less acid and the urine would tend toward the amphoteric point. This theory (which needs decided proof) would thus explain in great part the interference with the metabolic activity throughout the whole body, by showing that the increased alkalinity on the one hand impairs the activity of the digestive fluids and, on the other hand, increases the energy needed for the elimination of waste from the organism.

THE SILVER SALTS IN GONORRHEA.[1]

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THERE can be no doubt that the use of the organic silver salts has opened up a new era in the therapeutics of gonorrhea. The fact that solutions of these salts do not coagulate in albumenoid solutions is set forth as one of their chief characteristics, and is claimed to result in the greater penetration of these solutions into the deeper layers of the mucous membrane, thus producing a direct bactericidal action upon the gonococci.

Extensive clinical experience cannot fail to cast some doubt as to the latter contention. In spite of the use of strong injections of these remedies, extending over a considerable period of time, and followed by an apparent cessation of the urethral discharge and absence of gonococci, there are many cases where, after the lapse of two or three weeks, a discharge containing gonococci again appears. This is often the experience in first attacks, where there is no great likelihood of marked organic changes in the mucosa. It might be well to consider the pathology of an uncomplicated gonorrhea.

As Bumm and others (Brewer, in Morrow's "System of Genito-Urinary Diseases," 1893), have pointed out, the gonococci penetrate the epithelial covering of the mucous membrane, and, finding their way through and between the superficial cells, eventually reach the upper stratum of the subepithelial connective tissue. The irritation caused by this invasion results in an acute hyperemia of the part, with dilatation of the capillary vessel and exudation of serum. There is also an increased glandular secretion, with epithelial exfoliation. Later, an abundant transudation of leucocytes takes place from the dilated capillary vessels. These during their outward passage through the epithelial layer absorb and carry with them large numbers of gonococci. When the leucocytes have succeeded in removing the gonococci from the subepithelial tissue, and the gonococci invaded epithelial cells have been washed away, the symptoms begin to subside.

If this is true, then the local treatment of the disease consists in the employment of some method which will induce premature exfoliation of epithelial cells and promote local leucocytosis. This can be accomplished by various methods. The exfoliation of the epithelial layer of the mucous membrane can be increased by (1) the use of irritants; (2) the use of solutions which form albumenoids, such as silver nitrate solutions; (3) the employment of large quantities of fluids, such as the irrigations of weak solutions of potassium permanganate; (4) the employment of fluids, and with them the production of prolonged pressure.

1 Read before the Chicago Academy of Medicine, March 11, 1904.

That the last-named method is of great importance is evidenced by the following experiments. The following solutions were employed for these experiments:

Albargin, gelatose silver, 0.1 to 1 per cent. solution.
Argyrol, 2 per cent. to 10 per cent.
Argonin, casein of silver, 2 to 5 per cent.
Argentamin, 1 to 3 per cent. solution.
Largin, silver protalbin, ¼ to 1½ per cent.
Protargol, proteid of silver, ¼ to 5 per cent.
Picrotol, ¼ to 1½ per cent. solution.
Water.
Saline solufions.
Permanganate solution, 1 to 4,000 to 1 to 500.
Boric acid solution, 1 per cent.

The patient was instructed to use a large piston syringe.

The cases selected for treatment were all first attacks. All of the patients were instructed to first pass water; then to fill up the urethra with the injection, so as to produce tension; to hold in the injected fluid for from three to five minutes; the injection to be repeated five times a day.

Case I.—February 3, 1903. A young clerk, twenty years of age. Duration of discharge, four days. The discharge was profuse and purulent, containing many pus corpuscles, leucocytes, and many colonies of gonococci; not many epithelial cells. He was given a normal salt solution as an injection to be used five times a day. Upon the third day there was still much pain during urination, but the discharge was notably less, contained many leucocytes, many pavement epithelial cells containing gonococci, but few free colonies of gonococci. Upon the tenth day the discharge was mucoid in character, still containing many cells, but less gonococci, and with but few exceptions all imbedded in cells. On account of the pain, I gave him an injection of protargol, one-half of one per cent., followed upon the twentieth day by an astringent solution. The patient made a rather uneventful recovery.

Case II.—February 18, 1903. Laborer, twenty-three years of age. Duration of discharge, three days. Purulent in character. Contained many leucocytes and many free colonies of gonococci. Was given an injection of potassium permanganate, 1 to 2,000, to be used five times a day. The third day showed decided decrease in the discharge, and many epithelial cells, a few red blood corpuscles. Painful micturition. Sixth day, more epithelial cells. Contained gonococci, less pus. Eleventh day, mucoid discharge; few gonococci, mostly cells. Twentieth day, no gonococci. Given astringent injection. Used for two weeks. No return of discharge.

Case III.—March 5, 1903. Traveling salesman, aged twenty-nine years. Duration of discharge, six days. Discharge profuse and purulent; marked swelling of the meatus. Discharge contains much pus and many free colonies of gonococci. Injection; used protargol, one-half of one per cent. Upon the third day, some decrease in the discharge. Strength of injection increased to one and one-half per cent. Few free colonies of gonococci. Many cells containing gonococci. Tenth day, mucoid discharge; many cells containing gonococci. Fourteenth day, still cells; no gonococci. Injection continued to twenty-fourth day. The astringent injection employed for two weeks. No return of the discharge.

Case IV.—March 22, 1903. Dentist, twenty-seven years of age. Duration of discharge, two days. Profuse and purulent. Many gonococci in colonies. Injection; used argonin, two per cent. Third day, decrease in discharge. Fewer colonies of gonococci. Tenth day, discharge slight; many cells containing gonococci. Fifteenth day, few gonococci. Twenty-fourth day, no gonococci. Still some mucoid discharge. Astringent injection used for three weeks longer. No recurrence.

Case V.—March 27. Clerk, aged twenty-three years. Discharge purulent and of four days' duration. Contains gonococci, colonies. Injection; used targin, one-quarter of one per cent. Third day, discharge still profuse, but increase in cells, and strength of injection increased to two per cent. Fifth day, decrease, with fewer colonies of gonococci. Tenth day, discharge slight; many epithelial cells; some containing gonococci. Fifteenth day, still many cells, and few containing gonococci. Twentieth day, discharge ceased. Complains of pain in passing water. Astringent injection for ten days. No return.

Case VI.—May 11, 1903. Grocery clerk, aged nineteen years. Discharge for five days; purulent and profuse; contains many free colonies of gonococci. Injection used, argentamin, one per cent. Third day, passage of water painful; slight decrease in discharge. Injection increased to one and one-half per cent. Seventh day, increase in cells; decrease in free colonies of gonococci. Fourteenth day, slight discharge, containing many cells with gonococci. Twentieth day, mucoid discharge; many cells, and few gonococci. Twenty-eighth day, no discharge. Astringent solution for ten days. No return.

Case VII.—June 5, 1903. Bookkeeper, aged twenty-three years. Discharge for two days; profuse, and painful micturition. Many colonies of gonococci; few cells. Injection; boric acid solution, two per cent. Third day, decided increase in cells, containing gonococci; fewer free colonies. Tenth day, discharge decreased; still many cells containing gonococci. Fifteenth day, discharge slight; still many gonococci in cells. Twenth-fifth day, still gonococci in cells. Thirty-fifth day, no discharge; astringent solution two weeks. No return.

Case VIII.—September 23, 1903. Clerk, aged twenty-eight years. Discharge for three days. Quite profuse. Containing many free colonies of gonococci. Injection of distilled water, colored with methylene blue, 1 to 10,000. Third day, discharge free, but more cells containing gonococci. Tenth day, urination painful; discharge

slight; many cells containing gonococci. Fifteenth day, slight discharge, but still gonococci present. Treatment with water discontinued on account of pain. Argyrol used for two weeks. Subsequently astringent solution for two weeks.

Case IX.—November 16, 1903. Bookkeeper, aged twenty-four years. Discharge for six days; profuse, and purulent, containing many free colonies of gonococci. Urination painful. Argyrol solution, two per cent, used for injections. Third day, pain ceased at once, and discharge slight, containing many cells, gonococci imbedded in some of them. Sixth day, discharge almost ceased; some cells; few of them containing gonococci. Tenth day, no gonococci. Argyrol injection continued to twentieth day, followed for eight days with astringent solution. No recurrence.

Case X.—December 5, 1903. Clerk, aged thirty-one years. Duration of discharge, five days. Purulent and profuse. Many colonies of gonococci; few cells. Picrotol solution, one-quarter of one per cent. used for injection. Caused some pain. Third day, many cells containing gonococci; few free colonies. Sixth day, marked decrease in discharge, mostly cells, few containing gonococci. Tenth day, slight discharge; no gonococci in cells. Fifteenth day, no discharge. Astringent solution used for ten days. No recurrence.

It will be noted that in all these cases the discharge decreased quite rapidly, that its character changed markedly and that the exfoliation of mucous membrane cells where greatest promised the earliest relief. The cases in which the silver salts were employed suffered less in subjective symptoms, and made the best recoveries. Those treated with argyrol were probably the most satisfactory.

I can hardly believe that the organic silver salts owe their beneficial effects to the penetrating power of which so much has been written, but rather to the bactericidal effect produced upon gonococci imbedded in the upper epithelial layer, which is being exfoliated, and in preventing reinfection. From these experiments, I have come to the following conclusions:

1. That solutions of the silver salts, organic or inorganic, do not penetrate the mucosa to any great extent.

2. That the prolonged pressure of any fluid upon the urethral mucosa causes temporary compression of the capillaries; that the removal of this pressure is followed by dilatation of these capillaries, resulting in an increased leucocytosis through the walls of the vessels; that the point of least resistance is the lumen of the urethra; that this induces more rapid exfoliation of mucous membrane cells, and literally carries out the infectious agent.

3. That it is upon the free gonococci thus forced into the surface layer of the mucous membrane that the silver salts exercise this bactericidal action.

URGENT ADENECTOMY DURING THE PROGRESS OF A PNEUMONIA.

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Lobar pneumonia, while self-limited, is one of the diseases that requires and demands everything that can be done to support the system. In the following instance, during its progress an adenoid operation was performed with marked benefit to the patient.

As pneumonia is characterized by an engorgement of the blood vessels of the parts affected, we can readily understand why venesection was in vogue many years ago. Urgent dyspnea is relieved to-day by means of dry cups. The treatment is one directed toward local depletion. Literature records hundreds of cases of diphtheria in which the process involves the larynx causing laryngeal stenosis and finally the pathological condition invades the lungs and causes pneumonia. The vital indication in a case of stenosis is to intubate, whether pneumonia complicates it or not. For these reasons, to produce local depletion and to relieve an important mechanical obstruction, I did not hesitate to operate.

The record of the case is as follows: I was called by Dr. L. Friedberger to see the patient, Jos. G., aged four months, with the subjoined history.

The child who had been a mouth-breather from birth, had never been seriously ill. He had always taken his nourishment fairly well, although he was never able to drink steadily, being compelled to drop the nipple from time to time. He had now been ill with pneumonia for the past four days with marked dyspnea. The mother complained that the child would not close its mouth to take food or medicine except with extreme difficulty, and, as she knew of the existence of the adenoids, she desired to have them removed immediately.

The family physician explained that the child was practically taking no nourishment by mouth and as the bowels were irritable that direction was out of the question. He thought the symptoms were intensified by the adenoids.

Upon examination, I found a lobar pneumonia, right side, upper one half of lung being involved; temperature 105° F.; respirations, 60; pulse 140. Mouth-breathing marked and child in great distress, undoubtedly increased by the obstruction to nasal respiration. The prognosis was grave, yet the mother insisted upon having the adenoids removed. The risk was carefully explained to her, still she determined to have it done, and earnestly begged as she felt that the child would be relieved.

I consented to operate. With the child held upright in the nurse's arms, I cautiously curetted out the nasopharynx, removing quite a mass of adenoid tissue, using an instrument I had made

for infants. (*New York Med. Journal and Phil. Med. Journal,* Vol. LXXX, No. 7, p. 309).

The child seemed quite exhausted for a few hours, then dozed off at intervals, and twelve hours later began to take a little nourishment.

There was no postoperative treatment; the pneumonia, naturally, was looked after. The next day the temperature was 104° F., pulse 130, respiration 40—and the mother said the child rested much better. The patient gradually improved and on the ninth day the temperature was normal. This is the only case of its kind, that I know of, that has been reported.

115 West One Hundred and Twenty-first Street.

MEDICAL PROGRESS.

SURGERY.

Posterior Gastro-enterostomy.—It is not long ago since one of the leaders of American surgery characterized this as an unnecessarily complicated procedure, and pointed with just pride to a long list of successful anterior gastro-enterostomies. CHARLES L. SCUDDER, (*Annals of Surgery,* September, 1904) states that it is coming to be recognized the world over that the nearer to the origin of the jejunum the anastomosis of the stomach is made, the more satisfactory is the convalescence and subsequent course. In Krause's clinic alone, out of many visited by the author was the anterior operation still being used. Kocher's method of doing gastro-duodenostomy is advantageous, because the exit from the stomach is made proxymal to the bile and pancreatic supply. Finney's gastropyloduodenostomy is similarly physiological and each of these procedures is, in the author's opinion, preferable to posterior gastrojejunostomy when possible of application. Scudder's technic is as follows: An ample incision is made through the middle of the belly of the right rectus. This incision must be long. The great omentum and transverse colon are lifted completely out of the abdomen at the upper end of the wound, thus exposing the under surface of the transverse mesocolon. While the left hand grasps the colon, the left fingers push the posterior wall of the stomach in its pyloric portion firmly against the mesocolon and a small incision is made. This incision is enlarged by gentle tearing and should be four or five inches long. The posterior wall of the stomach is picked up by two forceps and the stomach clamp applied. This is placed obliquely upon the stomach so as to avoid the important vessels. The jejunum is similarly picked up and clamped. The anastomosis is so made that the gastric paristalsis corresponds in direction to the enteric. The first or peritoneal suture is taken with curved needle and No. 3 Pagenstecher linen thread. The Cushing suture is used. The curved needle is of such size that it can be conveniently used without a needle holder. The size of the opening which is made by knife and scissors, depends entirely upon the physical conditions. An opening of from 2½ to 3 inches is ordinarily needed. The prolapsed mucous membrane of both the stomach and jejunum is excised. This is done to facilitate subsequent suture and to prevent valve-like obstructions. The postoperative treatment consists in giving small nutrient enemata, one every eight hours for two days. After twenty-four hours liquids are given by mouth and at the end of a week solid foods are allowed. Vicious cycle has not occurred in any of the author's cases. Three questions are as yet unsolved in connection with this operation: (1) the relation between the patency of the pyloris and the permanency of the new opening; (2) the desirability of the permanency, and, (3) the likelihood of an ulcer forming in the jejunum.

Surgical Intervention in Renal Disease.—No branch of surgery has received such tremendous impetus of late years as this. America has been a confessed leader. A. YVERT (*Rev. de Chir.,* September, 1904) in a leading article draws an interesting and striking analogy between the nephrotomy of Pousson and the decapsulation of Edebohls. He divides the subject into three heads, intervention in acute nephritis, in chronic nephritis, and finally in certain essentially medical affections of the kidney itself. The acute conditions which are further subdivided into those arising from ascending infection, those of a circulatory type and those of mixed type, are discussed with admirable clearness and the effect of various treatments indicated. The author seems absolutely just in his treatment of the two opposing theories or technics, as they should more rightly be called, of decapsulation and kidney incision. He traces the steps by which Pousson reached his conclusions as to the efficiency of renal section, and shows to what a degree they resemble the steps by which Edebohls arrived at a very similar conclusion in regard to decapsulation. The review of decapsulation literature up to date is very full. As to the choice between the Pousson or the Edebohls operation, the author says, that in considering the two, the brilliant researches of the English surgeon, Harrison, should not be forgotten. To this early observer the tense capsule of the congested kidney of acute nephritis bore the same relation to that organ as the iris to the eye in cases of glaucoma. Furthermore, in the opinion of the author, although decortication does not appear to present either great technical difficulties or to entail serious postoperative complications, it is, nevertheless, well to recollect, that it constitutes in every case a somewhat more difficult intervention and one certainly more grave in its possible sequels than simple section of the kidneys. A further and even greater objection to decortication would appear to be that its benefits do not begin to show themselves until at the end of eight or ten days at the minimum, whereas, on the other hand Pousson's nephrotomy gives immediate results. Continuing, the author says: "It is essential to remember that the very principle of the technic of decortication has been brought under very severe criticism from a histological standpoint, it having been shown that the supposed increase of vascularity between the parenchyma of the kidney and the perirenal tissue probably exists either to a very small extent or else not at all. The good arising from decapsulation, then, must be attributed to a release of the endonephrytic tension, or else to a stimulation of the reflex renal nervous system." Accordingly, the conclusion is that in the present status, no positive choice can be made between decapsulation and nephrotomy in the treatment of chronic nephritis.

Neurofibroma of Acoustic Nerve.—Even to-day, in the face of the brilliant successes which have attended a great number of attempts to remove cortical brain growths, the proportion in which success is ultimately attained is small. Discouragingly true is this of growths which infiltrate the brain sub-

stance. FRAENKEL, HUNT, WOOLSEY and ELSBERG (*Annals of Surgery*, September, 1904) state that in their opinions the so-called acoustic neuromata constitute a group which may properly be considered as favorable for surgical intervention. This would unqualifiedly be true were it not for the deep situation of the growth in the triangular space at the base of the brain. This is formed by the junction of the cerebellum, medulla and pons. The growth under consideration is a neurofibroma springing from the acoustic nerve as it emerges from the junction of the pons and the medulla; hence the most important symptom is referable to a disturbed function of this nerve. Tinnitus aurium, Menieres syndrome and deafness are among these characteristic signs. Inasmuch as the development of the tumor is slow, the integrity of the nerve is usually preserved for a long period. Inasmuch, however, as the pons, the medulla and cerebellum form the margins of the small triangle in which the growth develops, it is not usual that symptoms traceable directly to pressure upon these parts may arise almost coincidentally with evidences of pressure on the nerve. At this stage also the well-known general symptoms of cerebral tumor are usually well developed. The tumors vary in size from a cherry to a bantam's egg. They are covered by a smooth capsule and are nodular. They are loosely attached to the basilar membranes, so that enucleation is readily accomplished. The technic of the operation, as described by Woolsey, is as follows: A large skin flap was turned down so as to expose the lower half of the squamous portion of the occipital bone and the posterior part of the left mastoid. The occipital was bared almost to the foramen magnum. The bone was here trephined and the opening enlarged. Its outer boundary was thus the lateral sinus and its inner the foramen. The dura was opened and the left cerebellar hemisphere bulged considerably. The finger introduced forward and inward beneath this could easily detect the tumor. It felt hard and could be distinguished from the brain. It was removed piece-meal by the finger, as it was too large to take out in toto. This resulted in laceration of the cerebellum. A drain was instituted to prevent blood-clot formation. Three hours after operation, the patient died in collapse, autopsy showing that death was due to hemorrhage within the left middle peduncle of the pons. Elsberg advises operation in two stages. The authors conclude that the acoustic tumor syndrome is well defined and that the diagnosis can be made with practical certainty. The slow and essentially benign nature of the growth and its easy enucleability favor surgical intervention. Its deep situation at the base in immediate proximity to vital centers offers very serious obstacles. Improvement in surgical technic should be made in the direction of avoiding undue concussion in the removal of bone, in perfecting a method of extirpation of the tumor by which it could be removed without injury to the surrounding parts and, lastly, division of the operation into stages.

Acute Intestinal Obstruction.—No phase of any pathological condition is more apt to be fatal in its consequences than acute intestinal obstruction and certainly none calls for more active and intelligent treatment. ARTHUR E. BARKER (*Lancet*, September 17, 1904) defines the factors in obstruction, which have to be treated surgically, as follows: (1) There are mechanical or anatomical factors; (2) physical factors, and third, vital factors. The first consideration very naturally demands the most immediate action and thorough technic. The position of the obstruction is a point of well-known importance. By "physical changes" the author includes the anemia and the venous engorgement of the different parts as well as the consequent edema, thrombosis and ulceration, one or all of which may follow intestinal obstruction. By "vital changes" he states that he refers to the most important factor of all. It may, as he says, be easy to mechanically relieve the cause of obstruction, but unfortunately, by the time the patient has reached the surgeon such changes have taken place that this does not suffice. There are swarms of bacteria and fecal material being constantly retrogated to the site of obstruction peristalsis. Great quantities of toxins are made, for which there is no escape save by absorption into the general system. Nor are the toxins alone in their migrations, for the depressed condition of the patient so enfeebles the reactionary powers of the serum and other protective agents, that bacteria themselves, migrating under these auspicious conditions to distant parts and setting up characteristic changes in them, often constitute the most serious type of vital change. The conclusions of this interesting article are as follows: (1) That hitherto too much stress has been laid upon the mere removal of the mechanical stoppage and not enough upon the evacuation of the putrid material, which is killing the patient; (2) that the older method of emptying the bowel by establishing an artificial anus is unsatisfactory, as the bowel is in a state of paresis or complete paralysis and only expels its contents very slowly and until it is cleaned out, the cause of the paralysis remains in great part. Any careful analysis of a long series of cases, probably in all that are still within the reach of any operative procedure, is to resect the tract of paralyzed and distended bowel at once. This would not, of course, apply to recent cases where the bowel is not seriously damaged by the retained feces and is manifestly sound at and above the seat of observation. But excluding these, there remains unfortunately a large group of cases where one is face to face with a disastrous state of things which requires very bold action. This free resection of the gut, which is viable, but in which sufficient change has taken place to paralyze its muscular activity, implies a wide and far-reaching departure from the usual course. It is well known that paresis is one of the most difficult conditions to treat when the intestine is seriously affected. It may, however, be that it is as desirable to resect palsied gut as to remove that which is dead. The after-treatmetn of these cases the author considers to be of extreme importance, and it is as revolutionary as his technic. He invariably sits them up in bed, often from the first day. Hitherto he believed that too little food had been given by the mouth. If in small quantities and of an easily digestible nature, it may be given safely with a greater degree of freedom than usually believed. This is particularly true of those cases in which the diseased bowel has been resected. The diarrhea, which often subvenes in these cases, is often troublesome, but since it represents nature's efforts to free the body from putrid material, it is not wise to check it too early. He advises large and continuous doses of carbonate of bismuth.

Appendicitis Complicated by Duodenogastric Ulceration.—Although the pathological conditions which lead to the condition are unknown, it is a well-recognized fact that ulceration of the stomach and of the duodenum is prone to be provoked, or, at any rate brought into activity by operation for the relief of other conditions. H. A. LEDYARD and R. E. SEDGWICK (*Lancet*, September 10, 1904,) report a post-mortem finding on an appendectomy case as follows: On the pancreatic surface of the duodenum was a large ulcer, the base of which was formed by pancreatic substance, in the midst of which opened two vessels of the third degree. There has been nothing unusual in the history of this appendectomy, except that hemorrhage from the bowels began about three days after operation and continued for twenty days. Rodman has suggested as a cause for this a septic thrombus in the omental vessels, and in support of this, it is noteworthy that in the case recorded the great omentum was adherent to the abdominal wall. The authors report a second case of a similar nature.

PATHOLOGY AND BACTERIOLOGY.

Arteriosclerosis in Nephritis.—In order to determine if arterial changes are always concomitant with intestinal nephritis, P. PRYM (*Virchow's Archiv*, Vol. 177, No. 3) examined the vessels of two young individuals who had died of Bright's disease, and who had not exhibited any clinical symptoms of arterial change during life. In both cases severe lesions were encountered in the smaller branches, most markedly in the afferent vessels of the kidneys, the intima was distinctly hyperplastic and fatty degeneration was very evident. It is probable that genuine morbus Brightii without beginning arteriosclerosis does not exist.

Syphilitic Aortitis.—D. FAHR (*Virchow's Archiv*, Vol. 177, No. 3) has often observed inflammatory changes in the aorta which manifest themselves as small infiltrations around the vasa vasorum of the adventitia. This infiltration may extend to the media and may become so intense that portions of the media are destroyed completely. The etiology of this process is very frequently syphilis, but it must not be forgotten that alcoholism and certain infectious diseases may be responsible for exactly the same lesions. Hence syphilis can never be diagnosed absolutely from the condition of the vessels, but if the granulation tissue of the media changes into connective tissue, which has a tendency to form a deep, retracting scar which manifests itself microscopically as a puckered depression, the case is very suspicious. Even extensive inflammatory changes alone in adventitia and media will not enable a diagnosis.

Fibrinous Coagula upon Placental Surface of Chorion.—Chorionic villi are generally covered by two layers, a cellular layer consisting of the cells of Langhans and a syncytial layer of nucleated protoplasma, without differentiation into cells. Where the syncytium clothes the villi the chorionic surface shows numerous capillaries; where it is absent and in its place a layer of fibrin is found, the capillaries are very scarce. The presence of the syncytiums is therefore dependent upon the existence of a capillary network in the opposite fetal connective tissue. Both disappear completely during the second half of pregnancy, and the syncytium is replaced by fibrin. Syncytium and fetal capillaries thus belong together, and the exchange of food and waste material between mother and the epithelial layer of the fetus is probably carried on by the syncytium. J. BILAND (*Virchow's Archiv*, Vol. 177, No. 3) states that the fibrin is derived from the maternal blood. The syncytium normally prevents coagulation, but when this disappears the blood will come in contact with the cellular layer which directly favors clotting, owing to the presence of a special enzyme. The cells will finally undergo coagulation necrosis and disappear. Later on the fibrin will lose its property of staining with specific stains, and will become canalized, owing to the activity of leucocytes.

Cirrhosis of the Liver from a New Standpoint.—In examining a large number of stomachs at autopsy, F. BLEICHRÖDER (*Virchow's Archiv*, Vol. 177, No. 3) was struck by the close resemblance of the gastric lesions of cirrhosis of the liver and with those of blood diseases, such as pernicious anemia and leucemia. In following up the subject, the author found a number of other points of resemblance. Thus, a marked anemia is often present in cirrhosis, and the red cells do not form rouleaux. Both cirrhosis and leucemia are often accompanied by ascites, and the splenic tumor in the former disease is certainly not due alone to stasis of the portal blood, for it is often well marked before other signs of portal obstruction are present. Furthermore, the spleen is much softer than it would be in simple congestion, and the veins contain many lymphocytes. An important point is the usual occurrence of red bone-marrow in cirrhosis, where normally yellow marrow exists. There is little evidence to assume that cirrhosis is a primary disease of the liver cells, for even in advanced cases their functions are preserved, that is, bile and urea are still formed, and the carbohydrate mechanism is not interfered with. It is much more rational to assume that cirrhosis belongs to the class of blood diseases, and that the characteristic lesions are due to the transport of lymphocytes from the spleen. These cells then migrate through the vessel walls, collect around the portal veins in the liver, and are finally converted into connective tissue. The same process, to a lesser extent, is seen in many acute infectious diseases where a hyperplasia of the spleen exists, and some of the lymphocytes are carried into the liver. The different forms of cirrhosis described are probably analogous in their origin, and transition forms occur frequently. The connective tissue is never pure, but is always mixed with round cells, a small number of which persist even in advanced stages. Variations in size and appearance of the liver do not depend upon different forms of inflammation, but merely upon the eventual distribution of the connective tissue. If jaundice occurs it is not obstructive in nature, since the gall-bladder always contains bile, and the passages are patent. It must be explained by the disintegration of red blood cells so common with all blood diseases, and has thus the same origin as the pigmentation, the deposit of iron in many organs, the anemia and the increased excretion of urobilin so frequently found in cirrhosis. Other organs may also participate in the hyperplasia, such as the kidneys, and where diabetes also exists, the pancreas. The process in these organs is precisely the same as that in the liver. Banti's disease should not be looked upon as a disease by itself, but merely as a form of cirrhosis. The proper therapy of cirrhosis is by arsenic, iron and quinine just as in anemia.

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CAUGHT RED-HANDED.

From time to time the Medical News has called editorial attention to the widespread and flagrant custom of drug substitution carried on by many retail pharmacists in this and other cities.

In many of these instances, as we have pointed out, the druggist has been the victim, at times innocent, at times apparently not unwilling, to the commercial argument of "something just as good," at a greatly reduced rate.

As intimated, this has been going on for a number of years, particularly for the proprietary remedies, but it has only been since the introduction of the modern synthetic analgesics and antiseptics that the rascally substitutors have enlarged their sphere of activities and practically preempted the market in this class of goods.

Heretofore all attempts to put a stop even to the more flagrant types of this traffic have been abortive, but we are pleased to learn that through the activities of some of the more sinned-against foreign drug houses a wholesale roundup of the counterfeiters has been successfully brought about, and we look for a proper treatment by the courts of these most malevolent criminals.

A brief glance at the list of the remedies which were actually found in process of manufacture, with false labels, false contents and improper directions, shows that many of our most trustworthy drugs are among them. Trional, aspirin, lactophenin, chloralamid, salol, phenacetin, salipyrine, sulphonal, urotropin, aristol, and a number of others, equally important remedies, were among those counterfeited.

While not oblivious to the importance of the great commercial loss that must result to the legitimate manufacturers from such wholesale substitutions, the widespread injury that results to the public is, we believe, of far greater importance.

Such a traffic, if permitted to continue, works devastation in many directions. It undermines the confidence of the patient in his physician, to the detriment of his patient's health, the physician is deterred from using well-established remedies, and in many instances substitution will actually cause death in patients who are seriously ill. It does not need great acumen to foretell that a dose of sulphonal given to quiet a patient ill with pneumonia, may cause death if over 80 per cent. of it is the impure and highly poisonous acetanilid; and this is one example only.

It is a matter for true congratulation if this murderous traffic can be stopped. We commend to the attention of the District Attorney the leaders of this gang of substitutors, and offer our hearty wish that they be prosecuted to the full extent of the law. Premeditated attempt to murder is a justifiable charge.

THE HEART AND AORTA IN CONGENITAL SYPHILITICS.

As investigations on syphilis multiply, it is becoming more and more certain that this disease spares no anatomical system of the body. Besides the vulgar lesions of the bones, skin and viscera, one knows that the nervous centers may be directly or indirectly attacked, as in tabes or general paralysis. Degny (Thesis, Paris, 1903) has shown by a large number of documents, that the circulatory apparatus is also involved in syphilis.

Numerous are now the instances where syphilis has produced myocarditis, cardiac sclerosis, endocarditis, and pericarditis, while Degny's study of aortitis and aortic aneurism shows that in about 50 per cent. the affections have a syphilitic origin. This authority has also described cardio-aortic syphilis, to which particular attention should be given. In point of fact, it can be shown that congenital syphilis may attack the cardio-aortic apparatus in three different ways, namely: (1) By producing syphilitic lesions in the myo-

cardium, just as is observed in the adult; (2) by favoring degenerations which are by no means syphilitic in nature, but whose primary cause appears to be due to the presence of the syphilitic virus, and (3) dystrophic lesions especially attacking the development of the heart and its valves.

Clinically, the latter group is by far the most important, and here may be included more particularly mitral stenosis, whose nature has so often been discussed, and which has usually been considered a lesion of hereditary tuberculosis. Degny relates several cases where the cardiac lesions coincided with various malformations, indicating in a most evident manner, a particular state of degeneration. As has been pointed out by Rendu, in these subjects the condition is more one of degeneration than of syphilitic manifestations in an active state.

In the second group one includes certain changes in the cardiac muscle fibers which are not specific, but which are found in cases of congenital syphilis. And, lastly, in the first group gummata of the myocardium and arteritis in various forms are found.

Houchard believes that there is reason to question whether or not congenital syphilis is not responsible for the production of aneurism more frequently than has generally been admitted. The question is still undecided, but he nevertheless thinks that it has been answered in the affirmative because no small number of cases of aortitis met with in young subjects or adults, as well as aortic and cerebral aneurisms, having no evident cause, are in reality the products of congenital syphilis.

It may be said that besides those lesions of syphilitic nature such as gummata, aortitis, endocarditis and myocarditis, all other lesions observed are parasyphilitic, and, in their production, several important factors enter into play.

In the first place, in nearly all cases one should incriminate a defect in nutrition, an organic loss of power in the newly-born syphilitic, whose development, from this very fact, is hindered, and who, still more, is placed in a most excellent condition of receptivity for secondary infections.

In point of fact, if clinically, under certain circumstances, and in the adult particularly, syphilis appears to be, or really is, indifferent to certain infections, as pneumonia for example, and although it does not appear to aggravate or favor their development, in the child, on the contrary, syphilitic weakness favors chronic infections. These children easily develop gastro-enteritis, athrepsia, purulent otitis, syphilitic coryza, and bronchitis.

Thus all the doors are thrown open for the reception of infection, for the production of a subacute or latent chronic endocarditis, and these in their turn are important aids for weakening the noble elements of the organism. These phenomena may easily transpire in intra-uterine life, and thus may be conceived the multiple parasyphilitic lesions that are sometimes observed at birth. Consequently, specific or superadded lesions, mechanical disturbances and general dystrophy are the principal causes presiding over the evolution of the congenital syphilitic cardiopathies.

The reason why this subject has been insufficiently studied and described is the great difficulty in making a diagnosis. The syphilitic infection may be unknown to the mother, while the infant may not present the specific cutaneous lesions, but, nevertheless, he is a congenital syphilitic, for he has contracted the disease from his father.

ECHOES AND NEWS.

NEW YORK.

New York Academy of Medicine.—There will be a meeting of the Section on Medicine on Tuesday evening, October 18, at 8:15 o'clock. Here is the interesting program: (I.) Presentation of Cases and Specimens. (II.) Clinical Reports: "Two Cases of Duodenal Ulcer with Operation," by W. L. Baner, M.D. (III.) Paper: "The Malarial Types of Infective Endocarditis," by Warren Coleman, M.D. (IV.) Paper: "The Present Status of the Clinical Value of Laboratory Tests as an Aid to the Practitioner," by John S. Thacher, M.D.

Eastern Medical Society.—The Section on Pediatrics of the Eastern Medical Society will meet on Thursday, October 20, at 8:30 P.M., at Clinton Hall, 151-153 Clinton Street. The papers of the evening will be: "Pathology of Emypema," by Edward Schnaper, M.D.; "A Résumé of 175 Cases of Empyema, Clinical Features, Prognosis and Treatment," by Henry Koplik, M.D. Discussion by Drs. Louis Fischer, Francis Huber, F. N. Wilson, A. E. Isaacs, J. Barsky, I. S. Hirsch, and others. There will also be a presentation of cases and new instruments.

Dr. Clifford Allbutt, Honorary Member of Academy.—At the close of the scientific meeting of the Academy on Thursday, October 6, President Andrew H. Smith introduced Dr. Thomas Clifford Allbutt, Regius Professor of Physic in the University of Cambridge, as an Honorary Member of the Academy.

Gifts for P. & S.—Among the gifts to Columbia University, announced during the past week, are $225,000 from Mr. and Mrs. W. D. Sloane for the Sloane Maternity Hospital and $60,000 from H. W. Carpentier, to endow a chair in the Medical Department.

St. Luke's Hospital, Utica.—St. Luke's Hospital in the city of Utica, which for the past twenty years

has been a successfully managed private hospital of fifty beds, is to have a new building on a new and better site, the gift of Mr. and Mrs. Frederick T. Proctor, of Utica. The new building, which is now nearing completion, is to have eighty beds, and is a fireproof structure of brick, stone and steel, of the most modern approved type. The entire expense of the building and furnishing is borne by this one family, and the structure completed is to be turned over to the present Board of Trustees of St. Luke's Home and Hospital. This is the largest single gift that has ever been made for philanthropic and charitable purposes in this part of the State.

PHILADELPHIA.

Medico-Chirurgical College.—Dr. William Pickett has been elected Professor of Mental and Nervous Diseases, to succeed the late Dr. F. Savary Pearce. Dr. Pickett has for several years held various responsible positions in connection with the Insane Department of the Philadelphia Hospital and is one of the most prominent of the younger neurologists of this city.

Bequest for Alma Mater.—By the will of Dr. Spencer Morris, of the class of 1871, the University of Pennsylvania receives $10,000, the income of which, to be known as the "Dr. Spencer Morris Prize," is to be awarded yearly to the person passing the best examination for the degree of doctor of medicine.

Lectures on Tropical Medicine.—The course of lectures on Tropical Medicine at the Jefferson Medical College is being delivered this year by Major Walter W. McCaw, M.D., U.S.A. The course consists of ten lectures. They are given Monday afternoons at 4 P.M., in the hospital amphitheater, beginning October 3.

Woman's Hospital Widens Scope.—The Women's Homeopathic Hospital at Twentieth Street and Susquehanna Avenue is to erect an additional building to be used as a man's ward. It has been run strictly as a woman's hospital for twenty years.

Parents May Visit Municipal Hospital.—In the future parents who have children under treatment in the Municipal Hospital, for any disease except smallpox, may visit them if they so desire. They will be furnished with protective suits by the city. Both phones have been installed in all the wards in order that information regarding patients may be obtained direct.

To Shorten Time of Keeping Milk.—Efforts are being made to shorten the time milk is kept before being delivered to the consumer. The idea of Director Martin is to have milk trains run late at night instead of early in the morning, thus obviating the necessity of keeping milk until the following morning as so often done at present. He says: "It is our effort to have an inspector meet every milk train and his inspection takes time. If it is not completed early enough to permit the serving of milk for breakfast, when most consumers desire it, the milk must be kept over until the next day. If the trains would come in late at night the inspectors can complete their work and release the milk in ample time for early morning distribution. The large wholesale dealers have been interested and they approve of the contemplated change. The railroads have promised to do all they can to assist."

Typhoid Epidemics in Pennsylvania.—Typhoid epidemics are in progress at West Chester and Pitcairn. There are from thirty to forty cases in the former town. A committee of physicians endorsed the action of the Board of Health in stopping a certain dairyman from serving milk. In Pitcairn there are fifty cases in a population of 3,000. As the result of inspection of the water supply by the State Board of Health, several dairies whose herds are supplied by springs containing bacteria have ceased their supply.

Report of Norristown Asylum.—The annual report of the male department of the State Hospital for the Insane at Norristown shows that of 1,175 patients on the rolls, 83 are on parole. Of these, 17 are employed as attendants in the various wards and in the refectory. Admissions for the last year were 216. Seventy-six patients were discharged restored, ten improved and three unimproved. There were 78 deaths during the year, a rate of 5.8 per cent. This is the lowest death-rate in fifteen years.

CHICAGO.

Campaign in Behalf of Tuberculous Patients.—Medical organizations of the State are planning a campaign of education and publicity for the purpose of arousing the public to the fact that a great part of the thousands of lives annually lost in Illinois through tuberculosis can be saved if the afflicted ones are sent in time to isolation camps, similar to the one established near Ottawa, Illinois. To secure the establishment and maintainance of such camps by the State is another purpose for which the movement has been started. Some of the most prominent physicians of Chicago and other cities and towns of the State, without regard to school of practice, have been chosen to organize a "Committee of Promotion" from citizens not members of the medical profession, which is expected to solicit and administer the funds needed for the campaign of education. A circular letter has been issued by the Illinois State Medical Society, the Illinois State Hoemopathic Society, and the Illinois State Eclectic Society, jointly, setting forth the purposes of the crusade and asking citizens to join in the work of promoting the movement. In this circular it is stated that seven thousand persons died of pulmonary tuberculosis in Illinois in 1903, and about half that number in Chicago alone. This means an annual loss to the State of $36,000,000, to say nothing of the attendant suffering and sorrow. The camp at Ottawa, under the administration of Dr. J. W. Pettit, of that city, is run on as nearly a self-supporting basis as possible, all medical services being gratuitous. In furtherance of the movement the circular states that the physicians of the State are ready to furnish newspaper articles, lectures before Chautauqua assemblies, teachers' institutes and other gatherings, and to render any other services that may be required of them in the cause without pay beyond the traveling and hotel expenses of the lecturers.

The Use of Bisulphide of Carbon in the Treatment of Tuberculosis.—Professor Coramilas, of Athens, Greece, read a paper with this title before the Chicago Medical Society, October 5. He gave an epitome of his work from 1891 up to the present time with the use of this agent. After detailing numerous experiments on animals with the bisulphide of carbon, and presenting a report of 64 cases, the author drew the following conclusions: (1) Bisulphide of carbon has no disagreeable effects; (2) it has a strong action against tubercle bacilli; (3) by its action as a parasiticide, antizymotic, antiseptic, dissolving, and penetrating all tissues, it cures tuberculosis; (4) it should not remain in obscurity, but take its place in therapeutics as a valuable remedy.

Some Common Errors in the Treatment of Pulmonary Tuberculosis.—Dr. Norman Bridge, in a paper with this title, read at the same meeting, said that the current methods in the treatment of the pul-

monary form of tuberculosis averaged better than those of old. Results showed this fact. The mortality of tuberculosis had been reduced in less than three decades by probably 29 per cent. of the former figure, or from 14.25 to 10 per cent. of all deaths. These results were not accidental, but were clearly due more to the better management of the pulmonary form than to any other influence. He said it was somewhat easier for the practitioner to think that quinine or cod-liver oil, or creosote, or a change of climate, some inhalations of drugs or a so-called antitoxin, was good for tuberculosis, than it was to understand that the great first purpose of all treatment was to increase the physiological power of the patient to resist the disease and destroy or circumscribe its course within his own body. With all our study and experimentation, and notwithstanding all our theories and hopes, this truth stood as the one cardinal postulate of the subject up to the present moment. Our greatest and most common error had been against this truth, and the results had been correspondingly sad. To give creosote to the extent of lowering the digestive power, or to give serum injections to the production of phlegmons and higher temperature, or to give coal-tar drugs for fever, while the patient was allowed to go on in his usually unhygienic course of life without advice of correction, was an error so awful in its results that not even confession and penance were sufficient atonement. And all practitioners had sinned in some of these directions, and some of them grievously. Every patient should be constantly supplied with outdoor atmosphere in such abundance that every successive inspiration brought a fresh dose of air to the lungs and none from previous expirations. Every one should have long hours of rest; if feverish, the rest recumbent should be almost or quite constant, for exercise increases the fever. The digestive powers should be made to do their best under the most careful supervision and direction toward improving the nutrition and possibly also the resisting power of the patient. Practitioners have believed the patients who say they could not eat because they had no appetite, forgetting that a patient could usually be led to take the right food as well as to take medicine. Practitioners have agreed with the patient's theory that an appetite is necessary, and that food must be adjusted to the appetite; whereas, the truth was that in tuberculosis the food ought to be adjusted to the patient, and the appetite to be ignored almost completely. A tuberculous patient was never helped to resist the disease by muscular development above his normal standard. A consumptive's body should always be well and equably clothed, and never be hampered or restricted by garments. Snug corsets and conventional gowns were an abomination for the tuberculous woman. Worn as they were by most such women, they frequently tipped the scales in favor of death rather than recovery. Pulmonary tuberculosis was a *long* disease, and required a long and steady course of the best hygiene an management to ensure final and lasting recovery. Climatic treatment of tuberculosis had rightly become popular the world over; yet he was compelled to the belief from abundant observation that of all the remedies prescribed for the tuberculous, one of the most unfortunate and unsatisfactory was climate as it was usually employed. Going away for climate was one of the most abused and misused of all the great measures for the sick; and so what ought to be a blessing unspeakable often became a pitiful deception and a vision of death. This misfortune was largely an error of the people, but the profession was greatly at fault about it also. In more than half of the instances where it was advised it was for the wrong kind of cases, or at the wrong time, or for the wrong people; that is, with poor regard for all the circumstances in the situation. The author mentioned a list of faults of climatic treatment. Finally, the surest proof of skill and usefulness of a physician was his capacity to turn to the benefit of the sick the simple and homely facilities that were all about them. The best results with the fewest tools was the test; and no more inviting task was ever offered to physicians than to bring to the thousands of tuberculous victims, who were unable to go properly to the better climates, and at or near their homes, the benefits of the modern treatment of this disease. And it could be done, either in their own houses or in home sanatoria, and done superbly in a large proportion of cases. If it were done, it would reduce the mortality another ten per cent., and it would be done, for the twentieth century internist was capable of it, and he must not fail.

GENERAL.

Congress of Military Surgeons.—The International Congress of Military Surgeons convened at the World's Fair Grounds with a large attendance. The congress is held in lieu of the thirteenth annual meeting of the Association of Military Surgeons of the United States and will continue during the week. It is presided over by Medical Director John Cropper Wise, of the United States Navy, assisted by Major James Evelyn Pilcher, of the United States navy. The objects of the Congress are to cultivate and maintain an international community of interest by which the services to the sick and wounded in war may be equalized, elaborated, and perfected throughout the world.

Psychoses Among Soldiers.—The hardships and bad food, as well as the nervous tension caused by the ever-present danger, all predispose the soldier in the field to nervous derangements and insanity, says the *Globe*. Russian physicians report that in the wars with both Turkey and China a large number of acute psychoses were met with, and many men who had gone mad were shot that they might not fall into the hands of Chinese torturers. During the present war, says the *British Medical Journal*, many cases of delirium have been observed in the garrison at Port Arthur. On board the Manchuria, when taken by the Japanese, were found fourteen insane soldiers.

New Hampshire Legal Civilization.—The legality of the practice of Christian Science in New Hampshire was upheld by the Supreme Court of the State. In substance the court holds that the practice of Christian Science is legal and that patients who have resorted to such treatment cannot recover any damages in case the practitioner uses the accepted Christian Science methods of treatment. It decides that Christian Science treatment is neither negligent nor deceitful, and that, as Mrs. Speed went to Mr. Tomlinson seeking Christian Science treatment, it was his duty to treat her by that method, and that she could not claim that such method of treatment was contrary to public policy.

Some Theories of Seasickness.—A French physicist, Professor M. R. Bonnin contributed an article to *La Nature* on "The Mechanical Theory of Seasickness," which was printed in that journal in its issue of September 10. He attacks the problem entirely from the physical side and tells us that when a body is swinging in space it has three forces acting upon it: (1) its own weight pulling it directly downward; (2) the centrifugal action which pulls it away from the pivot point; and (3) its inertia acting in the direction of its own motion. Considering a man on the

deck of a rolling ship as the swinging body "all of his internal organs suspended in the thorax and abdominal cavity tend to oscillate continually becoming relatively displaced from constant traction on their attachments. At certain moments the organs seem to rise, at others they appear to grow heavier, hence an effect of distress which may bring on nausea. Thus we see why the horizontal position which gives a point of rest to these organs in their receptacles, may, up to a certain point, diminish the effects of seasickness."

Looked at in the light of pure theory, Prof. Bonnin's idea certainly possesses the delightful and refreshing elements of ingenuity, but it is a theory and nothing more. It is, moreover, not a good scientific theory, for it fails to explain all of the facts in the case. Reasoning by analogy is always a dangerous process and never more so than when one is trying to explain a scientific fact. The relationship between a swaying pendulum observed on land and the swaying body of a man on a rolling ship is surely remote enough, and one wonders at the boldness of the conception. There is to be sure no exact proof of the etiology of *mal de mer* but were there one it would most likely come from the domain of experimental physiology rather than from the realms of pure mathematics. Has this good man never heard of the probable function of the semicircular canal in controlling, in part at least, the equilibrium of the body? If so he makes no mention of the fact. Dizziness and nausea are sometimes caused by irritation of the nerves of common sensation, though the relation of visceral sensations to equilibrium is very little known.. It is known, however, that interference with certain cerebral functions is a potent cause of nausea and vomiting and upon this fact depends the exhibition of several of the commoner drugs used as emetics. Professor Bonnin evidently considers seasickness a condition due to direct reflex from the stomach, and may it not be a psychical condition as well dependent upon the stimulation of the central ends of the vagus? Nothing is known concerning the communication of the vagi with the organs of hearing, yet variations of pressure on the endolymph might well account for a number of inexplicable sensory conditions. Moreover, seasickness is commonly preceded by giddiness and headache, which also point to the central origin of the affection. James has shown that among deaf-mutes, in which the internal ear was defective, rapid rotation in a swing failed to produce any untoward symptoms. Whether seasickness is dependent upon muscular, tactile, aural or visual senses, or upon all of these together, may remain unknown for many years to come, but its occurrence must be a very certain quantity for thousands of people who are willing to brave the wrath of Neptune in order to become acquainted with countries and nations lying beyond the seas.

Hygiene Congress.—The first International Congress for the Hygiene of Dwelling Houses and Homes has been called at the instigation of the French Hygienic Society, to meet in Paris on October 15 to 20. The premier, M. Combes, has accepted the honorary presidency, and specialities will discuss the various phases of domestic hygiene in six sections. The questions for one section are as to the proper construction of a city house, the garden, and the yard, the arrangements for proper supply of air and for winter heating, the disposal of garbage, and the like. Another section will discuss the same question in reference to country homes; a third will discuss the tenement problem; another schools, etc. The discussions are to be published, and a special house hygienic exhibition will be arranged in connection with the congress. There is already a general International Hygienic Exposition in Paris, running from August to the end of November.

Physicians in Russia.—While Germany has an overproduction of physicians, the reports of the Russian Ministry of the Interior complain of unusual dearth in that country, writes the *Evening Post*. The St. Petersburg *Medical Weekly* states that at present there are 21,827 physicians in Russia, of whom 21,090 are men and 757 are women. Of these European Russia has 19,188. Naturally, the cities are best supplied—St. Petersburg with 2,272; Moscow with 1,528; Warsaw with 1,043; Kiev with 689; Odessa with 613. In the Caucasus provinces there are 1,224; and in the possessions in Central Asia 459. The whole vast Siberia reports only 788. In southern European Russia there are districts where there is no physician for 100 versts around. The reason assigned for this paucity is the poor pay received, physicians being called only in the gravest cases, and many of the common people preferring the services of quacks and superstitious priests. The Military Department complains bitterly that it cannot secure a sufficient number of surgeons for the war. Rather singularly, a decrease in the number of medical students is reported from England also; the number in 1891 having been 2,405 for the United Kingdom, while the latest total enrollment is only 1,538. It will be recollected that Austria recently reported a similar state of affairs.

Extermination of Mosquitoes.—At the meeting of the State and Provincial Boards of Health of North America, held in Washington, D. C., last June, there was a discussion in regard to the extermination of mosquitoes, an official report of which has only just been issued. The following resolutions was adopted:

"Whereas, It has been established that the diseases of malaria and yellow fever are transmissible by mosquitoes of certain species; therefore, be it

"Resolved, That it is the duty of State boards of health to obtain such legislation and appropriations as may be necessary to secure drainage of swamp lands, and to treat the surface of shallow ponds and pools with such substances as are recognized as being destructive to the life of mosquitoes of all species."

Dr. L. O. Howard, chief entomologist of the United States Department of Agriculture, read a paper prepared by Henry Clay Weeks, of Bayside, L. I., secretary of the National Mosquito Extermination Society. This included the following statements: "Entomologists have disproved one of the most persistent mosquito fallacies—that mosquitoes may breed without water. This romance is heard from educated persons almost daily. Entomologists also have shown the efficiency and the rationale of oil as an exterminator. It falls upon those who state that there are other means of contracting malaria and yellow fever than by the bite of an inoculated mosquito to prove their case. The reverse has been most clearly shown. We may and should always maintain, too, that these actual diseases are not, by far, the only health reasons why mosquitoes should not be tolerated. There are, besides, the nervous irrigation, the disturbance of much-needed rest, and others of the less palpable cause of ill-health. Given, then, the certain proof we have of this menace and positive knowledge of the scientific means at our hand for its elimination, there would seem to be but one course, which should be immediately adopted and vigorously carried out, and that is, to get rid of the known conditions which cause the trouble, viz., standing water in every form—or else make

such water perfectly safe, as may be done by larvicides, or, if that may not be, by the installation of fishes. The main reliance should be drainage. It is about six years since the writer urged in the press first, the importance of drainage, as results had shown that drainage for commercial purposes had eliminated the pests; and from a close intimacy with such work since the idea has been positively established. A practical illustration of the need and results of anti-mosquito work may have escaped your notice. It is given in the *Comptes Rendus* of the Paris Academy of Sciences, and refers to the town of Ismailia, on the Suez Canal. Here formerly it was healthy. There were no mosquitoes. Suddenly they appeared, probably from conveyances of travel, and became unendurable. Between 1897 and 1902 there were 2,000 cases a year of malaria. Relief work was planned, and in one year, 1903, it reduced the cases to 200.

The Drug Frauds.—The only cause, writes the *Times*, for surprise in connection with the detection and arrest of the gang of swindlers and counterfeiters engaged in the manufacture and sale of faked drugs and pharmaceutical preparations is that it has taken so long to catch those pursuing this nefarious business. It would seem as if with ordinary detective intelligence this might have been accomplished long ago. To locate the lessee of a postoffice box should not be difficult, not should it have taken years to trace to their source circulars sent out by the thousand with a return address and a place of payment for C. O. D. orders. However, this is beside the fact. The question of police efficiency is not at the moment under consideration. The disquieting fact in connection with this startling revelation of a kind of crime which may determine the issue of life or death is not that unprincipled men should be very glad to make a dishonest profit in this way, and if the profit was large enough to incur the risk of State prison in connection with it. But the business of faking drugs is possible only with the guilty knowledge and cooperation of the druggists, wholesale, jobbing, and retail, who have bought and distributed the worthless or pernicious stuff, and who cannot plead innocence of wrong intent so plausibly as to deceive any one of ordinary intelligence. The only chance the fakir had of securing trade was to offer the false preparations at prices below those charged by persons handling them legitimately as manufacturers or agents. The druggist to whom such goods are offered at prices attractively cheap knew either that they were stolen or that they were not what they purported to be. To buy them under either assumption is to make himself deliberately particeps criminis. He might assume that they were "just as good" as the articles they imitated; but, inasmuch, as he could not know this, and was warranted in believing that it could not be true, since there would be only a narrow and unsatisfactory margin of profit in making a cheap imitation as good as the more expensive original, the druggist who has thus supplied himself and dispensed the false preparations on prescriptions is morally guilty of a crime much more serious than that of the commercial fraud of adulteration. It will do some good, of course, to detect and arrest the swindlers who supply these harmful because dangerous, or equally harmful because inert, cheap imitations of expensive pharmaceutical preparations. But it will not reach the root of the evil. As long as those who sell drugs are willing to buy these evidently dishonest imitations and vend them as the goods they imitate, there will be scroundrels ready and willing to manufacture them, just as there will be counterfeiters as long as there are persons willing to buy "green goods" or false coins. It would seem as if it were possible to begin reform in the drug trade from within—but this has seemed possible for so long that one may well despair of living long enough to see even the desire for it find expression in the discussions and resolutions of the associations which represent the business. Perhaps the physicians could assist the good work by a sufficiently emphatic expression of their views on the subject of substitution and imitation.

OBITUARY.

Dr. JOSEPH N. HENRY, U. S. Army, died suddenly October 3 at Devon, Penn. Dr. Henry was Brigade Surgeon in the Philippines for several years and expected to return to his post after some time spent in recuperation. His body was sent to Annapolis and buried with military honors.

CORRESPONDENCE.

OUR LONDON LETTER.

(From Our Special Correspondent.)

London, October 1.

LADY CURZON'S PHYSICIANS—NIELS FINSEN AND THE LIGHT TREATMENT—A FRENCH MEDICAL PILGRIMAGE TO LONDON—THE PASSING OF THE EYEGLASS—A VICTIM OF CHRISTIAN SCIENCE.

THE British public is watching with the keenest interest and sympathy the struggle between the powers of life and death, now going on over the sick-bed of Lady Curzon. In respect of medical skill, she has the best this country can offer. Watson Cheyne, who operated, is one of Lister's most distinguished pupils, and came with that great surgeon when he migrated from Edinburgh to London, nearly thirty years ago. He was for a long time Lister's assistant in his private practice, and it was owing to Lister's influence that he was appointed on the staff of King's College Hospital, where he now reigns in the place of his distinguished master. He is a typical Scot in appearance, a "son of the manse" with a truly Presbyterian austerity of manner and a full share of the "canniness" characteristic of his race. He has written much and well on septic diseases, and is a leading authority on cancer. He is a surgeon of sound judgment and a good, but not a brilliant, operator. Dr. Champneys is also a son of a clergyman, a Canon of the Church of England, and being an Oxford man, represents the culture which is here believed to be obtainable only at one of the older universities. He is on the staff of St. Bartholomew's Hospital, and is recognized as one of our foremost obstetricians; his professional character stands deservedly high. He was an ally of Sir John Williams, who has now retired from the smoke and bustle of active life, in his efforts to raise the standard of accuracy in gynecological statistics and generally improve the ethical tone of the profession. In this campaign both these champions of righteousness came into collision with Lawson Tait, at whom the "unco guid" always looked askance. Sir Thomas Barlow is an excellent all-round physician, who takes it somewhat ill that his name is still too much associated in the public mind with children's disease in which he first won

his reputation. He was physician to the household of Queen Victoria, and attended that sovereign in her last illness. In appearance, he is utterly unlike the typical fashionable physician, and he would not have described the death rattle in a queen's throat in the discreetly mysterious phrase used on that occasion by Sir R. Douglas Powell, who, in the bulletin announcing the passing away of the august patient said: "In the last few hours of life paresis of the pulmonary nerves set in, the heart beating steadily to the end."

The death of Finsen has been made the occasion of remarkable demonstrations of respect by crowned heads. Among them our own gracious sovereign has been conspicuous, having sent an autograph letter of condolence to the widow. Possibly this is to be explained as much by a wish on the part of His Majesty to please the Queen, as by any particular interest taken by King Edward in the discoverer of the light treatment. The Queen has been active in promoting the introduction of her fellow countryman's method in this country, and to her munificence is due the establishment of a light department at the London Hospital. Mr. Sydney Holland, the ruling spirit of that institution, was quick to perceive the splendid advertisement to be got out of the thing. He skilfully "nobbled" the Queen, went to Denmark in her train, and boomed the light treatment—and the London Hospital—in the press in a way which, were not charity supposed to cover the boldest advertising, might fairly be called indecent. And yet it is whispered by some who have seen the cases, that the results have been so unsatisfactory that the physicians did not care to publish them. However, this may be, no report, as far as I am aware, was published till this year when, at the annual meeting of the British Medical Association, Dr. J. H. Sequeria read a paper in which he stated that 216 cases treated by the Finsen light had been discharged as "cured." As no detailed report of the cases was vouchsafed, this bald statistical statement cannot be taken as proving much in favor of the treatment. Moreover, as the method has been in use only between two and three years at the London Hospital, any final conclusions on the subject must obviously be premature. Although Finsen himself, in his last publication, claims to have had only two per cent. of failures, it is well-known that several patients have been in attendance at the Copenhagen Light Institute ever since its establishment in 1896.

The *entente cordiale* between England and France is taking the form of fraternization among the members of the medical profession of the two countries. London is to be honored in October by a visit from a large party of French physicians, among whom are several men of note. These scientific pilgrims are to be taken to all the chief shrines of medical practice and research, and the arrangments for their hospitable entertainment are such as to dismay a person of average digestive power. It is characteristic of the pharisiasm of the profession in this country, that whereas at first the staffs of the great hospitals and the heads of laboratories were disposed to hold aloof, now when it has become clear that the thing is going to be a big success, they are scrambling to get into it. The promoters might well say, as Samuel Johnson did to Lord Chesterfield (I quote from memory): "Is not a patron, my Lord, one who watches, unconcerned, the struggles of a drowning man in the water, and when he has reached the shore, hastens to encumber him with help?"

Antivivisectors have a hospital of their own, about which the public has heard a good deal of late. The medical staff, as might be expected, is composed of men whose names are utterly unknown to the profession. One of these has now come forward—in the sensational papers—as the author of a "remarkable discovery" which is, if we are to believe his admirers, to revolutionize the treatment of defective vision. During the past twelve months, we are told, Mr. Stephen Smith, who is the author of a volume of antivivisectionist rant entitled *Scientific Research*, has excogitated what he calls a new plan of treating persons who hitherto have been obliged to wear spectacles. The other day "in the presence of a critical audience" he is said to have given a demonstration on patients whom he has treated. Cases of acute myopia, hypermetropia, and astigmatism were, we are asked to believe, shown to have been cured so far as to be able to dispense with spectacles. Some, it is alleged, are cured in a week, but in all cases the cure is rapid. According to a friendly scribe, "precisely what the method of treatment is remains the doctor's secret." It is stated, however, to consist in "manipulations of the eye"—an apt phrase which may be taken as describing the effect of the demonstration on the eyes of the "critical" spectators. An optician has challenged Mr. Smith to practice his method on half a dozen of test cases, of medium myopia, which he defines to mean cases which would need a correction of from —4.D. to —10.D. spectacles. He has further made the sporting offer that if these cases can be proved to the satisfaction of two British ophthalmic surgeons to be selected by himself and the *Daily Mail*, he will pay to a hospital the sum of $500. This challenge has been accepted by Mr. Smith, and we are therefore to have the curious spectacle of a therapeutic method in a highly technical province of the province of medicine tested "under the inspection" of the editor of the *Daily Mail!* In a statement made to a representative of another newspaper, of an even more "yellow" complexion, Mr. Smith is reported to have said that "the great bulk of cases are those of astigmatism, or errors of sight, and out of about thirty cases treated, I have found only three to be beyond improvement. Fifteen can see better than with their glasses, and are now cured, while in twelve cases the existing defects have been greatly mitigated." He added that this treatment consists in restoring the eyeball to its proper shape. "The eye defects coming under the headings of myopia (short sight), astigmatism (blurs and various errors of vision), and hypermetropia (long sight), are occasioned by various errors of shape in the eyeball. My method is to manipulate the eye, and thus correct errors of shape. This operation is painless and harmless." Mr. Smith's "discovery" would seem to threaten the extinction of the highly profitable industry of spectacle making, and even endanger the existence of specialists who profess to cure most of the ills that flesh is heir to with glasses. I do not think, however, that they need feel much alarm.

Mr. Colin Hunter, an associate of the Royal Academy and a distinguished artist, has just died under the hands of the Christian Science "healers." He had been suffering for nearly three years from cerebral softening and visceral complications. During all that time he has been under the care of Christian

Scientists. The one who was last in attendance, has stated that he was called in after six or seven "healers" had tried their powers on the patient, and the medical profession—apparently represented by homeopaths—had given the case up as hopeless. This particular "healer" claims to have cured Mr. Hunter of Bright's disease, liver disease, appendicitis, and other complaints including three paralytic strokes! Yet after all this tremendous expenditure of spiritual force the man died. Patients are so unreasonable. The case recalls that of our countryman, Harold Frederic, the well-known novelist, who died a few years ago in similar circumstances. Christian Science is said to be making headway in London, but about ninety-five of the adherents of Mother Eddy here are women and children, and the remainder are, what the poet calls, tenth transmitters of a foolish face, and sentimental persons in whom a vague mysticism has overclouded common sense. I believe the sect has not yet a church in London, although there are one or two meeting places where extracts from *Science and Health* are read to an audience, which to all appearance can lap itself in an elysium of mental vacuity akin to the Buddhist nirvana.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON SURGERY.

Stated Meeting, held October 7, 1904.

The Presdent, Robert T. Morris, M.D., in the Chair.

Resection of the Greater Part of the Stomach and Transverse Colon for Carcinoma.—Dr. A. A. Berg presented a patient upon whom he had performed this operation. The man was sent to Mount Sinai Hospital with the diagnosis of malignant disease of the pyloric end of the stomach, which diagnosis was confirmed and the subsequent operation, although exceedingly difficult because of the extensive glandular involvement, had proved particularly successful in its results. All of the stomach except a small portion of the cardiac end had been removed and a gastrojejunostomy had been done using the Murphy button. During the course of the operation, the middle colic artery was ligated and divided after which the transverse colon became pale and anemic, and in consequence of this, for fear of the following, Dr. Berg considered it best to remove this portion of the gut, which he accordingly did, using here also the Murphy button. The whole operation had occupied two hours, and twenty-four hours after the operation, the patient was given food by mouth. Nine days later when the gauze drain, which had been left in leading out from the site of the duodenal wound, was removed, there was some leakage from the bowel but this had soon ceased and now, three months after the operation, the external wound was almost healed and having only a slight serous discharge. The patient is now eating full regular meals with comfort, and had gained eighteen pounds in weight. A test breakfast had been given him recently, and after the usual period only one ounce had been obtained. Dr. Berg said, that as the patient was now able to take a large quantity of food at a meal, it indicated that there must be a pouch formed for its retention.

The Value of Oxygen in Connection with All Anesthetisation.—Dr. James T. Gwathmey read this paper. He said, that his attention had first been drawn to this subject by the remarkable, and, to him unwarranted, difference that Hewitt, in his book on anesthetics had made between laughing gas and oxygen and laughing gas and air on the one hand, and chloroform and oxygen and chloroform and air on the other. According to Hewitt, it has never been established, beyond all doubt, that by employing a certain percentage of air with laughing gas, a better form of anesthesia can be obtained, and also that by using oxygen instead of atmospheric air a still better form of anesthesia is obtainable. In the same connection, he dismisses chloroform and oxygen by saying that he had had no experience with this combination. Dr. Gwathmey said that, theoretically, he believed oxygen to be indicated in every case where an anesthetic is used, and he had carried out a series of experiments on cats to demonstrate the application of this theory. Asphyxiation, he said, during the administration of an anesthetic, is produced by the diminution of oxygen and not by the increased amount of carbon dioxide. Pattan and Rumph had found a decrease of forty per cent. of carbon dioxide eliminated in the respiratory exchanges, and Richet had found a decrease of fifty per cent. in chloralized dogs. Berts' experiments with chloroform had shown a progressive diminution in oxygen absorbed and of carbon dioxide given off. Lorraine Smith had shown that dyspnea from change in gaseous composition of the blood may be due to a deficiency of oxygen while Richet had stated that blood which contains an anesthetic in solution, preserves, when shaken with air, its full ability for freeing oxygen. The object of giving oxygen instead of air with laughing gas, Dr. Gwathmey said, is to be able to replace the high percentage of useless nitrogen in the air by a corresponding amount of useful nitrogen oxide, the percentage of oxygen remaining the same. Cyanosis and other evidences of diminished blood oxygenization would thus be prevented. His experiments had been carried on with the Junker inhaler, which is the apparatus commonly used in England for the administration of anesthetics. In this method as now employed, there is no possibility of determining whether or not the patient is getting a sufficient amount of air at each inspiration. If the amount is insufficient, a terrific and needless strain is placed at once upon the heart, which, if repeated, could easily bring on a train of symptoms that it might be impossible to check. He had remedied this defect by placing an easily inflated rubber bag next to the inhaler and by keeping this two-thirds full, the danger had been eliminated. His experiments had proved that the combination of chloroform and oxygen practically eliminated danger from anesthesia and reduced the after effects almost to a minimum. He presented tables covering one hundred experiments to show the comparative time required to kill cats with chloroform and air, and with chloroform and oxygen. These showed that the time required in the first instance had been approximately one-half of that required in the latter case, which, Dr. Gwathmey said, suggested that chloroform and oxygen was twice as safe as chloroform and air, and was equally as safe as ether. He concluded his paper with the statement that oxygen increases the value of all anesthetics while it does not decrease the value of the anesthesia. Dr. Gwathmey then adminstered chloroform to two cats, giving air in combination with chloroform to one and

oxygen and chloroform to the other. The cat receiving chloroform and air died in twenty minutes, while the one receiving the oxygen was still breathing quietly at the end of fifty-one minutes when the experiment was abandoned. Another cat was given ether and air and it died in seventeen minutes. A marked difference was noted in the behavior of the cats receiving the air and those breathing oxygen with the anesthetic, in the later there being almost no muscular spasms and very little struggling and the breathing being more quiet. This, Dr. Gwathmey said, had been observed in all his former experiments.

Granulating Wound Adhesions,—A New Application in Preventive Treatment.—Dr. Frederic Griffith reviewed the histology of wound healing and said, that the healing of wounds is prevented by friction, and that this might be prevented by some substance having blood for a basis, thus doing away with powders, salves, oiled silk, etc., now in use. This, he said, would furnish a physiological non-irritating substance for coapted wound walls. He presented specimens of the peritoneum of the common gray or sand shark which, he said, if properly prepared, might furnish the desired protection. He further said, that there is a proprietary preparation on the market which is based somewhat upon the blood idea.

Dr. Griffith also presented several bone chisels which, he said, had been made to overcome the usual difficulty encountered, in that they were made much lighter in the handles than those commonly used.

NEW YORK ACADEMY OF MEDICINE.

Section on Obstetrics and Gynecology.

Stated Meeting, held October 6, 1904.

The President, A. Palmer Dudley, M.D., in the Chair.

The After-Effects of Hysterectomy on the Nervous System.—Dr. Graeme M. Hammond said, that much might be said in general concerning the effects of the removal of the uterus upon the nervous system and the manifestations of these in the subsequent life of the individual, but that he would confine his remarks to the effects upon the brain for this only was markedly influenced. The peripheral nervous system, he said, was not affected by hysterectomy to any appreciable extent. Paranoia, epilepsy, hystero-epilepsy or profound neurasthenia may follow the removal of the uterus and ovaries, but these were not the direct results of the removal. Psychoses were not produced by hysterectomy but were the result, if they followed the operation at all, of the shock due to the operation, just as these conditions might follow any major operation upon other organs or members. If delusional insanity, paranoia, epilepsy, hystero-epilepsy or neurasthenia follow hysterectomy, they would have occurred whether the operation had been performed or not. The tendency or condition productive of these nervous diseases was already present before the removal of the uterus, and this condition or tendency consisted of a defective nervous system, present since birth, or acquired at puberty, or was the result of long continued illness for the cure of which, probably, hysterectomy was considered. The surgeon should consider these pre-established conditions when considering the advisability of hysterectomy. He said in conclusion, that no disease is peculiar to women in whom hysterectomy had been performed, that the stopping of the menstrual flow had nothing to do with nervous diseases following hysterectomy, and that previous congenital conditions, defective brain or acquired neuroses at the time of operation independently causative of posthysterectomy diseased conditions of the nervous system.

On the General Health.—Dr. Eugene Coleman Savidge said, that just as in the removal of an arm or a leg after an injury, so in considering the advisability of a hysterectomy many cases are debatable when the choice lies between the removal of the uterus or death, the operation should always be performed, but that a portion of ovarian tissue should always be left. Ovarian substance is necessary to prevent the subsequent renal, cardiac and other disturbances, which so frequently follow the removal of all the ovarian tissue. In ten years' gynecological experience at Roosevelt Hospital he had found that in a large number of women, from whom the uterus had been removed, a condition of defeminization had resulted, as evidenced by the lusterless eye, the roughening of the skin and voice, increased hair growth, increased deposit of fat, and a wiping out of zest in life. The effect of the consciousness of barrenness was marked in almost every case. The more highly organized nervous systems of American women, as compared with European women, is to be considered always in the indications for or against hysterectomy, and this is particularly true of debatable cases and it should be remembered that in many conditions, treatment more conservative than hysterectomy may suffice.

On the Sexual Functions.—Dr. Hiram N. Vineberg said, that it is not possible to discuss this subject with authority, because American women will not talk of this subject. It usually had very little to do with the conditions for which women consult their physicians. Many women have no sexual passion whatever, many have a great deal and many who, because of undeveloped uteri, cannot conceive, have greatly exaggerated sexual desire. There are others, to whom the sexual act is extremely repulsive, who are very desirous of being fondled, embraced and kissed. Some writers, he said, believe that the pleasure derived from the sexual act is purely localized in the reproductive organs, and in substantiation of this they have cited cases in which the ovaries had been removed before puberty, and this had been followed by masculine appearance, hair on the face, no fat deposit in the mons veneris, etc. Other investigators believed that sexual desire is a mental process, but with this he did not agree. Among his own cases, and in the literature on the subject, he had found that hysterectomy had produced no diminishing effect on the sexual desire, while in some it had caused a marked increase, and in none of his own cases had he found that the sexual desire had diminished except where the change had been the result of the age of the patient. His conclusion was that whatever effect hysterectomy may have on the general condition of the patient, it has little or none on the sexual feeling.

Dr. Cragin, in the discussion said, that the after-effects of hysterectomy must be considered comparatively, considering the condition of the patient before the operation and the removal of the uterus only, or the uterus and ovaries produce different effects. He did not agree with Dr. Hammond in

regard to his ideas of the effect upon the nervous system, and said, that his experience had taught him that a more profound effect was produced upon the nervous system by hysterectomy than by operations upon other organs. He said, that the cases which Dr. Savidge had observed in Roosevelt Hospital, were those cases which had been operated upon when the value of leaving ovarian tissue was not so well known, and when in consequence, the uterus and ovaries had been removed entirely. This, he said, produced more profound shock to the patient, and the after-effects were more marked, than when some ovarian substance had been left. When the ovaries or a part of them are left, removal of the uterus has comparatively little effect, and that certainly when hysterectomy is done for diseased conditions, the remaining condition is vastly better than before the operation. He further said, that if the cervix is left, at the time of removal of the uterus, and especially if part of the ovaries is left, the effect upon the marital relations is very small indeed. If, however, the cervix and ovaries be removed with the uterus, a marked decrease in the size of the vagina often followed, preventing the sexual act. In considering hysterectomy for diseased conditions, he said, that the danger to the life of the patient should be considered on the one hand, while on the other were comparatively minor effects of a vasomotor character.

Dr. Goffe said, that removal of the uterus removes the child-bearing function only, and that it has no effect upon sexual enjoyment, but that the loss of possible motherhood was well worth considering. The general mental, moral and emotional condition of the woman who has borne children should be weighed in comparison with that of the one who has not. He quoted Dr. Beebe, of Cincinnati, as believing that the ovary has to do with development and that sexual desire is located in the brain, but he said, that he himself considered that the ovary is the determining factor of sexual desire. He said, that many observers who had questioned patients whose uteri had been removed, report no effects upon sexual desire, but that the general health of the patient is the true test of her condition after hysterectomy, and they have stood the test in the majority of his patients notwithstanding the numerous nervous explosions which have sometimes occurred.

Dr. W. G. Wylie said, that he removed the ovaries only for diseased conditions, never for nervous troubles, and that he did not agree with Dr. Hammond, as he believed that the removal of the uterus sometimes produced nervous conditions or even melancholia. He said that this was particularly true in women under thirty years of age. Removal of the uterus from young women frequently produced vaginismus to a very marked degree. He also said, that all of the Fallopian tubes should be removed with the uterus.

Dr. Hammond said, in closing, that the integrity of the nervous system does not depend upon the ovaries. He had seen many cases to prove this, and that he had also seen a simple curettage followed by profound neurasthenia while he had seen many, upon whom hysterectomy had been performed, possessing perfect health.

Dr. Savidge further said, that the sexual passion many times persists after the menopause which would argue against the idea of hysterectomy diminishing sexual desire.

MEDICAL SOCIETY OF THE STATE OF PENNSYLVANIA.

Fifty-fourth Annual Meeting, held at Pittsburg, September 27, 28 and 29, 1904.

SECOND DAY—SEPTEMBER 28.—*Continued.*

(Continued from Page 720.)

The Removal of Internal Hemorrhoids by Excision.—Dr. Ernest Laplace, of Philadelphia, described the operation as follows: The patient is prepared as usual; placed on the left side, with the thighs flexed upon the abdomen. The sphincter ani is paralyzed by stretching with the thumbs. The hemorrhoidal area is brought into view by clamping with forceps each hemorrhoid at its upper and lower extremity, parallel with the length of the rectum. A curved Hagedorn needle, armed with No. 2 plain cumolized catgut is now passed immediately above the upper forceps, through the healthy mucous membrane, and the catgut suture is tied. The upper forceps being held in the left hand and drawn, the hemorrhoid will now be cut with curved scissors just enough to allow the cut to be closed by the immediate insertion of a continous suture with the needle just used. This first cut being closed, the hemorrhoid is again cut a little, and the wound closed by the same continuous stitch, and so the procedure is repeated until the hemorrhoid is removed, when the suture is finally tied. Should any hemorrhage occur another whipped suture is applied locally and controls it. Each hemorrhoid is dealt with in this way, until sufficient of the hemorrhoidal area is removed. Eighty-three cases have been operated upon by this method in the last four years, with most satisfactory results. Patients have been sent home as early as the second day after operation, there being no danger from hemorrhage, or sepsis, and the catgut taking care of itself and dropping out spontaneously. Delicate longitudinal scars are formed corresponding with each hemorrhoid that has been removed. The advantages claimed for the method, are precision, absence of hemorrhage, during or after the operation, safety and simplicity, as well as a minimum of pain.

Retrodisplacement of the Uterus.—Dr. Henry D. Beyea, of Philadelphia, divided the case into (1) acute retrodisplacement and (2) chronic retrodisplacement, in the former of which when uncomplicated he had found the most satisfactory treatment to be the application of a properly fitted Smith or Hodge pessary. He gave in detail the technic of the operation, and in his 465 patients, one only had died; there had been no complications attending subsequent gestations or labors, and 95 per cent. of those from whom he had been able to receive reports, have had complete relief of symptoms or improvement in health.

Dr. Charles P. Noble, of Philadelphia, in discussing this paper, stated that the only class of cases in which he had found the pessary of value was in those following labor, in which with rest treatment, about one-third had been cured. In the surgical treatment he divided the cases into the classes in which the appendages were diseased, and those in which they were normal, in the latter of which he preferred the Alexander operation. He also was favorably inclined toward the operation described by the author, but felt that the percentage of failures was somewhat larger than with the Alexander operation.

Disturbance of Menstruation and Their Significance.—Dr. E. E. Montgomery, of Philadelphia, went carefully into the causes of the flow, and considered the disturbed conditions under amenorrhea, which may be either congenital constitutional or mechanical; dysmenorrhea, which owing to the present mode of dress is rapidly increasing; menorrhagia and metrorrhagia, and viacrious menstruation, a discharge periodically from some other surface than the uterine mucosa.

Overlapping of the Aponeurosis in the Closure of Abdominal Wounds.—Dr. Charles P. Noble, of Philadelphia, said that he had first used this procedure in 1894 for umbilical hernia, and since 1897 had employed it in all incisions in over 150 cases, as by overlapping the aponeurosis in this way you can secure firmer union than by any other method.

Pernicious Vomiting of Seven Years' Duration Cured by Suspension of the Kidney.—Dr. George Erety Shoemaker, of Philadelphia, reported the case of a woman aged twenty-eight years, who had an attack of typhoid fever seven years before, accompanied by hemorrhage from the bowel and vomiting of blood, and followed by phlebitis of both lower extremities, and nausea and vomiting occurring three or four times a day and induced during the latter time, not only by taking food but by nervous excitement. These were worse near the menstrual period. During this seven years she had subsisted mainly upon infants foods, and had undergone various treatments, including rest, lavage and dilation of the uterus, the latter being followed by some temporary benefit. Upon admission to the hospital, the right kidney was found to have descended to the level of the umbilicus, replacement of which and the removal of the left tube, ovary and appendix was followed by complete recovery.

Tumors of the Cerebellum and Cerebellopontile Angle.—Drs. Charles K. Mills and Charles H. Frazier, of Philadelphia, stated that the existence in the cerebellum or its immediate environs of a tumor was comparatively easy of diagnosis, the symptoms being optic neuritis, headache, vertigo, nausea and vomiting, asthenia, atonia and nystagmus, but the localization thereof is not an easy task. The author stated that the eighth nerve was the most common seat of tumors of the cerebellopontile angle, the symptoms being impairment or loss of hearing with tinnitus, often associated with facial, trigeminal and ocular paresis on the side of the lesion, ataxia and the general symptoms of brain tumor. In conclusion, Dr. Mills insisted upon early operation, in the first place, to remove the tumor when this was possible, and secondly, when successful removal cannot be hoped for, to relieve the urgent and distressing and destroying general symptoms, such as headache and optic neuritis.

Section A.—*Continued.*

Tympanites.—Dr. J. C. O'Day, of Oil City, referred to an unfortunate experience in his first case of obstinate tympanites not operated upon. While believing with Miles F. Porter that needle puncture is unsurgical, he is convinced from an experience of two cases that the operation should be encouraged, inasmuch as its dangers are nil, and because many, untrained in the use of the knife, could resort to this simple procedure with successful result. Two cases were cited which had been treated by needle puncture with perfect recovery.

Glimpses of Auto-Intoxication.—Dr. Edwin W. Moore, of Franklin, held that the real cause of auto-intoxication is an unsolved mystery, and claimed that perverted nutrition and cell destruction affords sufficient cause to justify it a place as a causative factor in disease. He mentioned the various actions of the liver, and suggested a difference in the area of its production and that resulting from the metabolism of tissue. He separated auto-intoxication from infection by giving to the infection theorists all conditions of exogenous origin and to the auto-intoxication investigators those of endogenous origin. He admits a large field of toxemias between these extremes as unclassified and of no known definite origin. He specializes rheumatism, gout, many nervous diseases, jaundice from obstruction, Addison's disease and many gastro-enteric conditions as auto-intoxications, and questions the right of investigators in claiming anemia as an infection.

Symptomatology and Treatment of Influenza.—Dr. Samuel Wolfe, of Philadelphia, said that the history of influenza, recurring since 1889, showed characteristic deviations from the classical type, but that the affinity of the specific cause for mucous membranes and nervous structures is constantly demonstrated. There is reason to believe that certain symptoms are caused by the bacillus itself, and certain others by the toxin resulting from it, but strict differentiation is not yet practicable. The treatment aims at the control and mitigation of such conditions as fever, pain, catarrhal inflammations and central nervous derangements. Facilitating the elimination of the toxin must be regarded as important.

Pleurisy with Effusion.—Dr. J. E. Rigg, of Wilkinsburg, in this paper considered the influence of the teaching of pathological anatomy and bacteriology as causative factors and for classification, and the value of impartial clinical observations; also the frequency of pleurisy as found at autopsies, the forms of pleurisy, tuberculosis as a predisposing cause, and cold, traumatism and infection as exciting causes. The relative frequency of pleurisy with effusion to empyema was referred to. Under symptoms and diagnosis the author treated of friction, pain direct and reflected; the presence of respiratory sound and the use of the aspirator as a means of diagnosis and why it at times fails. In treatment the value of blisters in the early stage was discussed, the optional use of the aspirator, with the positive signs for the prompt use of the aspirator. The value of tincture of aconite combined with belladonna is mentioned.

Pneumonia.—Dr. John R. McCartey, of Fredonia, is at variance with those advocating the expectant treatment. He brings forward spirit of chloroform, which, from thirty-two years' experience with it, he considers specific when given early. The author cited two cases. The first, seen as soon as the patient emerged from severe chill, was given 20 minims every 15 minutes for six doses and every hour thereafter; dismissed the next day. In the second case the patient was seen eight hours after initial chill and dismissed on the third day. The remedy is of no avail after hepatization is established. He usually combines aconite with it now. Salicylic acid alone will cure and abort pneumonia by its antiseptic action. Dr. McCartey gives it by absorption by dissolving it in gasoline and applying it externally. Ergot was mentioned as of much value. His mortality has been but 2 per cent.

Blood Analysis.—Dr. J. M. McNall, of Wilkinsburg, referred to the advantages of blood analysis.

The definition of leucocytosis was given with its varieties, absolute and relative, and emphasis given to the importance of relative count and leucocyte curve. Blood analysis, it was stated, was probably no more applicable than in the leucemias and anemias. Pernicious anemia was considered and its relation to secondary; its faulty hematogenesis and hematolysis, characteristic marrow lesion and cells, their embryonic type. Other generative changes and findings were given. The blood picture of anemia was given with its differentiation from pernicious anemia. The limitations and requirements of blood analysis were outlined.

Sea-Bathing.—Dr. Philip Marvel, of Atlantic City, N. J., referred to the great antiquity of sea-bathing as a curative for bodily ills. The influence of temperature, physical conditions of the atmosphere, the physical and mental condition of the individual and the fact that the water is truly a mineral water, were facts not to be lost sight of. Observations were noted of the slowing or enfeeblement of the pulse of those submerged for hours in the sea and of those immersed for a time in water at a temperature higher than that of the body with a lowering in the systemic resistance. He believes that sea-bathing, as practised on the Atlantic coast, is responsible for greater harm than good, and he believes that physicians have been too long silent on the subject. They should impress upon those under their care the advantages of a short exposure, not exceeding thirty minutes, and the necessity for prompt and positive reaction. Sea-bathing is indicated in those weakened conditions where normal metabolism is inhibited or perverted nutrition exists, and is contraindicated where the arterial elasticity has been changed or lost, as in arteriosclerosis and capillary fibrosis; also in those cases in which the peripheral vessels have ceased to respond to reflex stimuli, in any condition in which the stimulation would favor internal hemorrhage; in case of chronic heart disease and in cases in which lowered resistance necessitates more than ordinary care of the patient's forces.

Some Remarks on Physical Diagnosis: (a) Ulnar Palpation; (b) Transmanual Auscultation.—Dr. David Reisman, of Philadelphia, designated as (*a*) ulnar palpation a method of palpation which he believes gives more satisfactory results that the one commonly employed, namely: The laying on of the flat of the hand while the patient is speaking. Dr. Reisman's method consists in applying the ulnar surface of the hand and little finger into each interspace, the hand being held perpendicularly to the chest. The method enables one to discover small shades of difference in the fremitus of contiguous interspaces or corresponding areas of the two sides. It also shows accurately the upper level of an effusion and the limits of a plastic exudate. It is of most value in examining the front of the chest, but may be also used for the back. (*b*) After speaking of the difficulties of the method of timing heart murmurs and of the unsatisfactory results generally given by timing murmurs by means of the carotid pulse, Dr. Riesman described a method which overcame some of the difficulties. It consists in auscultating with the binaural stethoscope through the hand placed over the apex beat. By this method the apex beat is felt and the murmur heard at the same point and timing becomes easy. The best stethoscope for the purpose is one provided with a diaphragm. Not only is it possible to hear murmurs plainly through the hand, but almost as satisfactory results can be obtained by placing a finger flexed at a right angle on the apex and then resting the stethoscope on the finger. The principal advantage of transmanual auscultation is found in the differentiation of presystolic from systolic murmurs. It is also of use in timing musical and other peculiar murmurs heard over the chest. The successful application of the method presupposes the existence of a palpable heart. Both methods were illustrated with photographs.

Myocardial Degeneration.—Dr. Albert E. Roussel, of Philadelphia, stated that if the statistics of Schott were accepted, it would be found that diseases of the myocardium were more frequent than those of the endocardium in the proportion of 505 to 245. He believed that arteriosclerosis must be accepted as an important factor in many cases of cardiac degeneration. He considered it worthy of remembrance that at least partial occlusion of the coronary arteries due to this cause may be compensated through the vessels of Thebesius with avoidance of the otherwise resulting damage. Parenchymatous degeneration, fatty heart and allied conditions were considered with their etiology and treatment. The diagnosis of many cases of fatty degeneration the author believes, more difficult than that of a fibroid heart, and he is confident that often cases of this disease are not recognized even after a physical examination. This is because the size of the heart in simple fatty degeneration is little changed, and the area of dulness presents no alteration.

Practical Points Concerning Smallpox.—Dr. William M. Davis, of Pittsburg, in this paper emphasized the importance of taking into consideration the entire symptom complex. Contrary to some opinions, he believes the primary fever to be quite contagious. The varieties of smallpox in reference to diagnosis and prognosis were discussed. The treatment of corneal ulceration, a frequent complication, was detailed.

THIRD DAY—SEPTEMBER 29.

Section A.

Test for Blood in the Feces and Its Clinical Significance.—Dr. J. Dutton Steele, of Philadelphia, said that by occult is meant an amount of blood so small that it cannot be recognized by the naked eye or by the microscope. It has been found by certain German observers that the old guaiac test for hemoglobin can be so modified as to detect extremely small amounts of blood in the feces. They have applied this test in the diagnosis of all lesions of the gastro-intestinal tract that cause hemorrhage. It is of special value in the diagnosis of gastric carcinoma and gastric and duodenal ulcers. The blood is constantly present in the stools of carcinoma, and is intermittently present in cases of gastric and duodenal ulcer and organic but benign stricture of the pyloris. Dr. Steele reported seven cases in which the test had been applied and in which the test appeared to be as valuable as is claimed for it. He is of the opinion that the method is a distinct advance in the diagnosis of gastro-intestinal diseases, and will soon rank with such symptoms as the abscence of hydrochloric acid in cancer or hyperacidity in ulcer.

Tuberculosis of the Gastro-Intestinal Tract.—Dr. J. A. Lichty, of Pittsburg, presented this contribution. The patient, thirty-six years of age, had no pulmonary signs, but had alternate diarrhea and

constipation. She had been exposed to tuberculosis for five years. At autopsy a perforation of the bowels was found near the ileocecal valve. Partial obstruction was present at the splenic flexure of the colon. The modes of infection of the gastro-intestinal tract were given as *primary;* (*a*) by inspiration, (*b*) by kissing, (*c*) by dirty objects or contaminated hands which find access to the mouth, (*d*) food from infected animals, or food which accidentally becomes infected; *or secondary,* that is, from the swallowing of sputum which is tuberculous.

The Diagnosis of Cirrhosis of the Liver.—Dr. Alfred Stengel, of Philadelphia, stated that cirrhosis of the liver is usually recognized when the disease has reached a practically incurable stage. This statement, however, Dr. Stengel said, needs some modification, for occasionally, cases not recognized until ascites and other signs of portal obstruction have developed recover from these striking symptoms and survive, which is probably due to the fact that with the terminal cirrhotic change in the liver there is always a considerable amount of cellular infiltration which is removable. The speaker referred to a certain train of symptoms met with in the earlier stages of cases of cirrhosis as well as in other conditions, and then proceeded to a discussion of the differential diagnosis. With regard to the occurrence of enlargement in the early stage of cirrhosis, the speaker stated that, contrary to the opinion of Leube, he had watched cases of cirrhosis from a stage when the liver was enlarged to the terminal contracted condition. The symptoms in congestion are practically those that usually are seen, but there is always found some adequate circulatory cause for the congestion, some form of cardiac or obstructive pulmonary disease which prevents the proper circulation of the blood, the most frequent cause being cardiac or circulatory weakness, the congestion is found to fluctuate with the fluctuations in the underlying condition. Dr. Stengel referred to the chemistry of cirrhosis and stated, that the only test that had proved of any value, and this merely confirmative, is that for urobilin. Among the conditions causing the train of symptoms met with, cirrhosis is the only one which regularly produces urobilinuria. Finally, in referring to the physical examination for cirrhosis in its more advanced stages, the speaker warned against a too ready acceptance of the results of percussion as an indication of decrease in the size of the spleen, and advocated a more general appreciation of the value of splenic enlargement in the diagnosis of cirrhosis of the liver.

Dr. David L. Edsall, of Philadelphia, referred to alimentary levulosuria as one of the chemical methods used in the diagnosis of liver disease. Strauss administered 100 grams of levulose on an empty stomach, and determined that levulose appeared in the urine in a large proportion of cases of liver disease, but in only a small proportion of cases of disease of other kinds. Dr. Edsall, from his own results and those of others, is skeptical as to the diagnostic value of this test. He emphasized the ease with which the test for urobilinuria may be carried out when the method of Hammerschlag is used. A test which Dr. Edsall has used and which he still looks upon with an entirely tentative judgment, but which has seemed to him to be quite as valuable as urobilinuria, is the determination of large amounts of phenol in the urine. He first used this test for the reason that the liver has the function of destroying the products of putrefaction that come from the gastro-intestinal tract or otherwise protecting the organism from them.. He thought that it would be worth while to determine to what extent these products of putrefaction escape into the general circulation and then into the urine in liver disease, as a loss of the liver's function, more or less complete might be indicated by their escape in abnormal quantity. Of the various substances that Dr. Edsall investigated in this connection, he found that phenol alone seemed to show reasonably characteristic changes. While this substance is variable in liver disease, it does seem to him that a very large amount of phenol in the urine is strongly suggestive of liver disease when other evident reasons for its presence are absent.

(To be Continued.)

BRITISH MEDICAL ASSOCIATION.

Seventy-second Annual Meeting, held at Oxford, England, July 26, 27, 28 and 29, 1904.

SECTION ON PATHOLOGY.—*Continued.*

(Continued from Page 672.)

Some New Lines of Inquiry.—He next referred to three pieces of work which he thought opens up vistas of much significance. The first of these is the work of Meyer and Ransome. In this research these observers, extending the observations of others, have established the fact that tetanus toxin reaches the nerve cells by means of the motor axones only. They have also brought out certain very striking facts regarding the action of antitoxin. It has been usual to suppose that if a sufficient amount of antitoxin were injected, toxin might subsequently be injected freely without any disease resulting. But the observers referred to have shown that even the injection of a very large excess of antitoxin is insufficient to entirely protect an animal if the subsequent injection even of a small amount of toxin be practised in a motor nerve. From this they argue that while the toxin reaches the nerve cells by the protoplasm of the axones, antitoxin only reaches them by the very much more round-about route of the lymphatics. But much more important is their observation that even in an animal actively immunized against tetanus, and possessing a fairly potent antitoxic serum, this fact will not prevent the development of tetanus if the toxin be injected into a motor nerve. If this observation is confirmed, then it appears unlikely that, as Ehrlich had held, antitoxin is formed in the nerve cells. In this respect Ehrlich's theory was largely founded on the observations of Wassermann and Takaki on the fixation of tetanus toxin in the brain of susceptible animals. Though the validity of this observation has not been denied, yet the interpretation has given rise to much dispute, and we must admit that at present we know of no definite facts which point to the place of origin of antitoxin. If antitoxin be not formed in the susceptible cells, one difficulty which existed in accepting Ehrlich's original view is removed—namely, what becomes of the toxophorous affinities during the process of immunization when the cell is being bombarded with fresh amounts of toxin. The view that the saturation of the side chains of the cell with toxin made them drop off with their burden of toxin always appeared to him to be hardly tenable, in view of the fact originally put forward by Ehrlich that the reason for the affinity of toxin for the cell was probably to be found in the fact that the toxin closely resem-

bled the normal food of the cell. It would be of little use to the cell if a side chain should straightway drop off into the serum whenever a food particle became attached to it. The whole view was too theoretical. The second piece of modern work calling for attention as a new departure is that of Muir, which appears to him to be the most important of all the recent contributions to the interactions of the constituents of hemolytic serums. Muir has investigated further the observations of Ehrlich that in blood corpuscles probably there exist more affinities capable of being saturated by immune body than those which are actually concerned in hemolysis when complement is supplied. He has shown that when corpuscles are thoroughly saturated with immune body, it is possible to dissociate a certain amount of the immune body and to cause it to become attached to fresh corpuscles. A not unimportant aspect of this observation is the deduction following from it that an exchange of molecules can take place between cells when these cells are merely in contact with each other. Further, Muir shows that for each moiety of immune body taken up by corpuscles a corresponding amount of complement can be taken up. This establishment of a definite quantitative relationship in the reaction suggests a definite chemical reaction between immune body, complement, and red blood corpuscles, and is opposed to the view of Bordet and the French school generally that the action of immune body is what they describe as a sensitization. But Muir's most important observation here is that after red blood corpuscles have taken up as much immune body as they are capable of, and when to the combination as much complement has been added as again can be taken up, still some of the immune body but none of the complement can be dissociated from the combination, and this immune body is dissociated in the original form in which it became attached, that is, it does not bring off any complement in combination with it. As Muir points out—and the observation is of very great weight—such an experiment seems incompatible with Ehrlich's view that immune body forms a link between the red blood cells and complement. In his latest work (with Browning) Muir brings forward evidence that the lysis by complement of red blood corpuscles saturated with immune body alters the affinity of these corpuscles for the weakened complementary bodies or complementoids which can be produced from complements by heat. This observation, taken along with the earlier results, opens up entirely new questions regarding the relationship of immune body which in the near future will demand an answer. The third work to which he referred is that of Wright and Douglas. As is well known, the question of the exact part played by the act of the ingestion of bacteria by cells in the killing of these bacteria, has for long been in a most unsatisfactory position. Phagocytosis is an indisputable fact which every bacteriologist has constantly before him under the microscope, but under what circumstances it occurs, and by what laws it is governed, constitute questions to which no answer could be given. But one cannot help feeling that the investigators named have by their work given ground for the hope that before long some of the much-needed light will be forthcoming. For one thing, Wright, by the elaboration of methods of the highest precision, had previously laid the foundation for the attack on the problems on which he is now engaged. And further, thanks to the beautiful method of Leishman, we have now a means of measuring exactly the phagocytic power of a cell by counting how many bacteria it can ingest in a given time. These observers have made a weighty contribution to our knowledge of the relative parts played by the bactericidal power of the serum, and by the intracellular destruction of bacteria. They have shown that in the case of the normal man some bacteria are killed extracellularly, whilst with others the serum has no bactericidal effect, but phagocytosis is the prominent feature when these bacteria are introduced into the blood. Wright and Douglas have further shown that, when bacteria are ingested, in the case examined these bacteria are previously sensitized by union with a substance existing in the plasma, and which Wright and Douglas call an opsonin. What these opsonins are, and whence they come, is a matter for the future, but any one who has had to plod wearily across the acres of barren papers which have hitherto formed the literature of phagocytosis will feel that the edge of the desert has been at length reached.

While the precise inter-relations of the substances concerned in the actual killing of bacteria, and, it may be, the possible variations in the processes at work in individual cases must occupy much attention in the near future, the work of Wright and Douglas raises another question, namely, of how far the struggle between bacteria on the one hand and the bodily cells on the other does not involve in the case of the latter a symbiosis between different types of cells or between different activities of the same cells. The attempt to answer this question, taken along with all the existing evidence for the idea that cells work through the agency of chemical substances will inevitably lead to a closer inquiry than has hitherto taken place into the sources of the, it may be, varied substances which require to come into activity in any one case. And it is here that our discussion to-day touches very closely that of to-morrow on the rôle of the lymphocyte. The outstanding feature in an infection is the state of embryonic activity into which the wandering cells and endothelia of the body are thrown. Part of this activity may be toxic in origin, and may be looked on as the result of an injury to cells, part may be of the nature of a response to what may be called physiological injury, that is, an injury which results in more work being done. We are ignorant of the true nature of the principles underlying this process connected, as it must be, with hypertrophy as a whole. At present we can only admit as a fact that when a tissue requires to do more work more work is done. In the present case the greater work done by the increased number of cells may be partly of a mere scavenging character. The result may only be that the toxic remains of bacteria may be swept out of existence. But part of the work may be the elaboration of the chemical substances required for the active killing of bacteria or for the building up of antitoxic material. Prima facie there is a case for the wandering cells of the body and especially the leucocytes playing a part in these processes. What exactly that part may be and whether other cells in the bodily organs also take most striking at present is that with all the work which is being done in hematology, we still require more light on the nature and functions of such cells and, especially in relation to immunity, we need parallel observations in which the chemical proper-

ties of the blood are correlated with its microscopic character. Much help might also come from further study of the comparative morphology of the leucocytes, and here the work of Gulland, and lately of such workers as Hirschfield and Meinertz, has opened up the way for further advance. In this connection the most striking feature seems to be the fact that in nearly all mammalia, and even in many fishes and birds, the cells most uniformly found are of the type of which the large hyaline cell and the small cell with basophilic granules in its protoplasm, occurring in man, are the most familiar examples. But the most interesting fact that comes out from this study is the extraordinary diversity which occurs in the animal series in the cells of which the polymorphonucleate cell is the type. With regard to them, we are still far from appreciating what the significance of minute differences in form and granulation signify. Some light might come on this problem by the comparative inquiry involved in the study of the same infection in animals with corpuscles of different forms. Whatever line of research here is fruitful, it is certain that the study of immunity will not be complete till we know not only the substances concerned in the processes of high immunization and of ordinary resistance to a first attack of disease and the interrelation of these substances, but also the sources from which these substances are derived and the laws which govern their formation. From our present standpoint, no knowledge would be in this connection more interesting or important than the knowledge of the precise part played by wandering cells in the nutrition of the lower forms of life. As Ehrlich pointed out, both toxins and the constituents of the bacterial protoplasm must in chemical composition closely resemble the ordinary food material of animal cells. The further fact of the existence in the blood serum of substances closely allied to immune bodies points to a close relationship between the principles underlying immunity and some process of ordinary metabolism. The only other view which might be put forward is that the qualities to which immunity is due have come from the survival of the most immune. Such a hypothesis is difficult to maintain in view of the ease with which new and artificial disease conditions can be brought into existence at the will of the pathologist and of the conditions of natural immunity which are found to obtain against these artificial diseases. All the facts indicate that when the subject of immunity begins to be more clearly opened out it may be found that the methods by which the effects of an invading bacterium are met are merely special manifestations of the normal interdependence of groups of the bodily cells one on another.

Historical Résumé.—In continuing the discussion William Bulloch, of London, gave an excellent historical and critical summary of the various sides of the general subject without indicating more than the drift of the present series of inquiry.

Agglutinins.—Georges Dreyer, of Copenhagen, spoke of some results obtained in the study of the agglutinating substances of the colon bacillus. Agglutination by heat, by acids, and by alkalies, were discussed.

Section on Tropical Medicine.

Prophylaxis of Malaria.—An important discussion of this topic was taken up by Drs. Jos. Stephens, Rose, Duncan, James, Christopher and others: Dr. Stephens said, that it may help to make more precise his views if, instead of recounting the methods of prophylaxis used and the results achieved in Italy, in British, French, and German tropical possessions, in Japan, he considered some scientific aspects of the problem which in many of the publications on this subject seem to have been overlooked. It is, he thought, not unnecessary to point out even now how malaria is contracted. It has been for centuries believed that malaria is contracted from the vapor of marshes; and now that certain mosquitoes are proved to be the cause, it is not uncommon to overlook the means whereby the mosquito produces malaria, and still to attribute malaria to the presence of the water in which the mosquito breeds, the "shallow pools," etc. It seems that this is to take a wrong standpoint, that the public should be educated to regard not the pool, not the mosquito, not even the anopheline, as the source of danger, but the infected anopheline; and he would go further: he would have everybody clearly understand how it is that the anopheline becomes infected—that is, can convey malaria. It results from the fact which, he believes, not 1 in 100 laymen in the tropics knows—that malaria is a contagious disease. The source of contagion unsuspected by the laymen lies in the fact that in the tropics the native population, especially the child population, carries malaria parasites in its blood; that it does so, often while presenting not the least outward sign of sickness. It is this apparently healthy but actually highly infected population which is the great source of malaria parasites, and hence of danger, to the European. It is from the native that the malaria-bearing mosquito gets its parasites, and these it transmits again after the lapse. The native population may show no outward sign of sickness. The native also dies from malaria, but if one wishes to see malaria in its severest forms, let him visit some up-country miner's camp or Europeon settlement in the bush. There he will find those "malarial wrecks," the fever-stricken pioneers, "down with fever," as it is called, vomiting incessantly, with a temperature of 105° F., in constant dread of black-water fever, which not uncommonly supervenes. Those who live in the towns not uncommonly forget that it is in these out-stations that malaria exists in its most virulent form. He dwelt on this condition, because it is the lot of these unfortunate Europeans to fill the "white man's grave," because he thought that in schemes for eradicating malaria they are forgotten.

Contagiousness of Malaria.—Malaria is a contagious disease. It has been the great discovery of Ross, that it is a certain mosquito that conveys the contagion. We know that certain mosquitoes, of the subfamily *Anophelina*, alone can convey the contagion. Of anophelines there exists about a hundred species. Which of these, or do all of them in different parts of the world convey malaria? It is surprising that on this point there is but scanty information.

The number of species that are known to convey malaria may almost be counted on ten fingers. They are in Europe—*A. maculipennis* (mainly); *A. bifurcatus* (less concerned); *P. superpictus; M. pseudopictus* (especially in some parts). In Africa *A. maculipennis* (in Algeria); *P. costalis* and *M. funesta* (especially in tropical Africa), and *P. Chaudoyei*. In India *M. listoni, M. culicifacies, N. maculipalpis* (?). In North America *A. maculipennis*. In West Indies *Ce. albipes*, that is, a dozen species only of which we can say with any certainty they convey malaria, out of nearly a hundred existing species. But it may be urged if one species conveys malaria another will; that is not a scientific argument, and nothing short of actual proof

should be allowed to satisfy us. One can go further, and say that the profession has a certain amount of evidence, gradually increasing, to show that all species do not convey malaria. He recalled the results obtained by Christophers and himself in India. They formed the hypothesis, based upon general observations, that all species of anophelines were not concerned in the transmission of malaria. They put this hypothesis to the test in two very malarial places in India—Mian Mir (Punjab) and Ennur (Madras). They caught in the same huts, at the same time, in these two far distant places two species of anophelines—*M. rossii* and *M. culicifacies*. They determined by actual dissection which of these species contained parasites (sporozoits), and found as follows:

In Mian Mir.

—	Number Dissected.	Number Infected.	Percentage.
M. culicifacies . .	259	12	4.6
M. rossii	496	0	0
In Ennur.			
M. culicifacies . .	69	6	8.6
M. rossii	364	0	0

So that *M. rossii* was not carrying malaria under conditions where *M. culicifacies* was. These observations have been repeated by others and the result is always the same. *M. rossii* does not in nature convey malaria. This, while scientifically of great interest, is also of practical value. Shall money and time be spent in eradicating *M. rossii* when as far as one knows it is not concerned in the transmission of malaria? These mosquitoes exist in myriads in Calcutta, Madras, Bombay, and in large towns, and are believed to be harmless.

Whether *A. punctipennis* conveys malaria in nature remains to be seen. Similar results (unpublished) have been obtained in Japan. These results, then, show that certain species of anophelines do not convey malaria, and on general grounds there is little evidence to connect those species which we know as "wild" mosquitoes with the transmission of malaria. Anyhow, it should not suffice to state simply "the *Anopheles* was found" without stating what species of anopheline; but, most important of all, it should be determined by actual dissection whether or no that species does transmit malaria. The practical bearing of these facts is obvious. If we can positively state that a certain species of anopheline does not transmit malaria, it will obviously simplify operations directed against mosquitoes. Another point of great interest in connection with anophelines is their breeding grounds. Take again the two Indian species mentioned above, *M. rossii* and *M. culicifacies*. Christophers and Stephens showed in India that, broadly speaking, each anopheline has a breeding ground of its own. At any rate, in the case of the above two species they are totally distinct and different in nature, and whereas *M. rossii* breeds in the shallow pool or puddle some inches deep only, *M. culicifacies* does nothing of the kind. It is never found breeding in these dirty puddles; it loves clear, fresh water, of streams, rivers, canals, and other moving water, where it occurs in myriads. Now if these results are true, that *M. rossii* does not carry malaria, and no doubt has yet been thrown on them, it means that it is unnecessary to attack the breeding grounds of *M. rossii*. This means an immense saving in labor and expense, for even during the dry season the pools in which *M. rossii* breeds are very numerous, and during the rains they are legion. Minute work, then, is still required on breeding grounds on the habits of larvæ, their enemies, fish, beetle, beetle larvæ, and the like, natural larvicides so to speak, all these points may be of great practical import.

The Flight of Mosquitoes.—Then, again, there is a question of flight of mosquitoes, a very important problem. Christophers and Stephens were constantly engaged in trying to make observations on this point, because we used to read alarming statements published by hasty writers that mosquitoes (genus and species it is needless to say not mentioned) flew fifteen miles, so that it seemed to us, if it were so, whatever might be done to free a place from anophelines there was nothing to prevent some of these long fliers coming, with parasites in them, into a district just made free and undoing all one's labors. But close observations convinced them that nothing of the kind happened, or perhaps, to be strictly accurate, did not happen under the conditions they knew of, and all their observations repeatedly made and checked, tended to show that the normal flight of anophelines was a matter of some hundred yards and not miles. Thus they observed that the center of Freetown, the capital of Sierra Leone, was completely free from anophelines. They slept during many months there at all seasons of the year in four different houses and never saw anophlines in their rooms—*Stegomyia*, of course in hordes. But a quarter to half-a-mile away it was very different; there anophelines were as thick as bees. What was the difference? The center of Freetown was in fact a town with large stone houses, open streets, and moderately well-arranged surface drains. But in the outskirts one comes to the streams, with their countless larvæ, in the back-waters and pools, and to the native huts, infested with anophelines, having therein a plentiful supply of blood. Why, then, should they fly abroad and visit the center of the town? In fact they did not, and the result is this important condition, that in the center of Freetown a quarter to half a mile from deadly centers of infection one has a segregated protected area, where the danger of contracting malaria is extremely remote. Again, by a series of observations they made in India they were able indirectly to come to somewhat similar conclusions. They sought to determine why, of a series of villages in the same district, one was highly malarious, another only slightly so, and they found that this was almost entirely dependent on the number of anophelines there present, and that the number of anophelines was dependent on another factor—the presence or absence of breeding grounds past or present; so that when a village was distant three-quarters of a mile from breeding grounds the amount of malaria—the endemic index as we termed it—was reduced to very low dimensions—5 per cent. or 0 per cent., instead of 50 to 70 per cent. where breeding grounds surrounded the native huts. They concluded from these observations that a distance of about a mile from breeding grounds was sufficient to protect that village from malaria, consequently that here at all events this distance was beyond the normal flight of anophelines. The distance in Freetown was decidedly less than this, a quarter to half a mile. These observations seemed to them of some importance as indicating the distance that sufficed to give protection from mosquitoes, or at least a considerable if not an absolute degree of protection. This question of flight of course requires still further study, since, as we shall see later, under certain conditions it may be a complicated one, resulting in distances as great as one to two miles being traversed. One sees, then, that various

problems still exist for a more complete solution than they were able to give in the time at our disposal, and that these problems have considerable bearing on the question of prophylaxis, and that the prophylaxis of malaria will not be best achieved by blindly proceeding to act against mosquitoes as a whole, but by careful action based upon accurate study of all the habits of mosquitoes. Dr. Stephens unduly prolonged these preliminary considerations, but their importance is in his opinion immense, and they are at present practically completely neglected.

Prophylaxis.—In the remaining portion of his paper he considered very briefly modes of prophylaxis, pointing out what in his opinion are the merits or demerits of each system. For in fact it would appear from the advocates of these systems that one and only one method exists—that is, the one advocated by the particular person. Thus it seems to be the aim of the advocates of each system to decry that of others. This does not appear to be the best solution of the problem, for that method that may succeed in one place may quite conceivably fail in another where the conditions are entirely different.

The measures usually adopted are:

1. *Antilarval.*—Of this method it appears to be fundamental and thorough, provided it takes the form of systematic drainage, and that it is the method which should as a sanitary reform be followed as a steady continuous policy. Its merits consist in the obvious fact that as the mosquito breeds in water, if this water can be drained away, the number of larvæ in that area must diminish, and probably if there is no influx from without the number of mosquitoes, and probably also of malaria. It seemed to him that this method should take from the first this form—namely, drainage—and that it is not wise to substitute for it petrolage except as a temporary makeshift, without any attempt to diminish the real source of the mosquitoes—namely, the water.

2. Mechanical prophylaxis by wire netting, etc. That by this means excellent results can be got those of the Italians show. The Japanese have likewise applied it to their troops, with the remarkable result that in a particular regiment the entries diminished from 2,000 odd in 1900 to 256 in the first six months of 1903. We are told that the sentries wore veils and gloves at night!

3. With regard to quinine. He believes this method, too, excellent, and the success attending it remarkable. How far applicable in every locality local conditions must decide. He believes its applicability is somewhat limited, but this should not hinder its adoption in suitable circumstances. In many isolated villages he believes malaria could readily be stamped out in this way, where antilarval measures would be impossible owing to the fact that the larvæ breed in the rice swamps surrounding the villages. A quinine prophylaxis among Europeans in small settlements has given in the hands of the Germans excellent results. The so-called gram prophylaxis, repeated on two consecutive days, has in certain instances been thoroughly effective, and it should be noted that there is no danger of the quinine producing blackwater fever, for, on the contrary, it is among those insufficiently protected with small doses—that is, among those suffering from malaria—that quinine induces blackwater fever.

4. Next, he called attention to a mode of prophylaxis—namely, "segregation of Europeans." It was, however, recommended by Ross as "one of the fundamental principles which the State must adopt in order to extirpate malaria in tropical cities." Major Ross has informed him personally, however, that this was done on general sanitary ground, only, and not on the special grounds resulting from the demonstration by Christophers and myself that the natives were the source of European infection in the tropics. He thinks, then, that they may claim in their report to the Royal Society of May, 1900, to have first put forward this as a definite prophylactic measure based upon our knowledge of how Europeans are infected. Manson has also declared segregation to be the first law of hygiene for the Europeans in the tropics. Dr. Stephens is led to advocate this measure with all the seriousness and urgency he could, because he had seen for himself during two years' traveling in British possessions in Africa the terrible effects resulting from its neglect. That it was a practical policy he had no doubt. He had, in fact, seen it carried out—on general grounds—in Accra, where most of the officials enjoy the protection of well isolated bungalows well separated from the unsanitary native huts; unsanitary in a very special sense, for it is here that anophelines are infected. He had seen that the segregation of Government House, Freetown, a quarter of a mile from native huts, afforded complete protection. It is a policy that can be carried out in the case of single bungalows, situated in the bush, in larger settlements, and even eventually in towns. And yet an African Governor has denounced it as academical (although actually in existence in Accra), impolitic, and so forth. That it is not so is shown by the fact that another African and unprejudiced Governor, who had no system of his own, has actually carried out this prophylactic method, and, personally, he rejoices to learn that in several Gold Coast stations the Europeans now enjoy segregated cantonments. The principle, in fact, in its widest application is that we see over the whole of India, namely, European cantonment and native bazaar. In its more limited and still easier application it means that the European bungalows should not be built as now, in the midst of a native village, surrounded by huts, swarming with infected anophelines, but that an isolated site some half-mile away should be chosen. He believes the immunity then given to Europeans living hitherto in the midst of infected anophelines will be very great. It was an urgent matter and one easily carried out, and one that would at once save many lives, while measures for draining large towns would be a matter of many years. But it is also said that it is not a just method, for the native is neglected, the native must be treated as the white man. Within limits this is true, but it is the limits that alter the nature of the case. When the sanitary and general education of the native population has made any progress whatever, it will then, perhaps, be possible to begin to treat natives and Europeans alike; but until that happy day arrives it is not right to sacrifice European lives that are daily sacrificed to such false sentimental ideas.

The Success of Mosquito Destruction Operations.—Captain S. P. James, I.M.S.; and Lieutenant S. R. Christopher, I.M.S., read this paper. They said so many operations where mosquito destruction has been successfully carried out are reported that it appears almost unnecessary to ask how far such measures may be considered of practical utility in diminishing the incidence of malaria. It is, indeed, only when one makes a closer study of the reports of operations that one realizes in how many cases little or no proof of success is given, and in how many conclusion of success is based on such inconclusive evidence as the number of admissions to hospital and popular report. As regards the number of breeding places it is necessary to

destroy in order to bring about a successful result, we find curiously optimistic ideas very prevalent, and it is far from unusual to see a reduction in admission rates put down to the most trivial and inadequate operations. In perusing such accounts one finds it very difficult to reconcile these easy and triumphant successes with the extreme difficulty encountered in their own efforts. The operations undertaken by the Government of India at Mian Mir were throughout very thorough. Every effort was made to make the destruction of breeding places complete, and experiments were continued for over two years. Many hundreds of pools were drained or filled, and throughout the whole area systematic search for and destruction of breeding places was consistently carried out. Here, then, if mosquito destruction is so readily brought about as would seem from so many accounts, one should have been able to show a very marked and decided reduction in the number of adult *Anopheles* and malaria. As a matter of fact the result in both cases was poor and totally out of proportion to the means employed. If adults were reduced in number it was demonstrable only in the first four or five weeks of the rains with the onset of which the fever season begins. Later on in the season it only required the care always necessary for the detection of *Anopheles* to make it very obvious that marvelously little reduction in their numbers had taken place. The effect upon malaria consited in the delay of the onset of the fever season from the end of August to the end of September. In October the most strenuous and apparently complete measures against breeding places seemed not to influence malaria either in the bazaars or among the troops.

To what are they to ascribe the absence of the usual successful issue? They do not feel justified in considering it due to want of thoroughness in the conduct of the operations nor to peculiar conditions in Mian Mir. There is little doubt that the difference is entirely due to the great disparity in the value of the tests used in estimating the reality of results achieved. In very few instances has an attempt been made to verify a reduction in the number of adult *Anopheles;* nor has a reduction in endemic malaria, as shown by the number of infected natives, ever been demonstrated. The endemic index of Freetown approaches 100 per cent. If measures really possess the success claimed for them it should not be difficult to reduce this to 50 per cent. or less. Short of a reduction in this percentage infection they cannot claim a success in the reduction of malaria. In their reports on the experiment at Mian Mir they attempted to give some idea of the determinable effect of the operations, and succeeded in actually demonstrating such effect, though it was but partial.

Their attempts to really show what has been the effect of operations have a distinct value. They show that destruction of *Anopheles* sufficiently complete to be of practical importance as a prophylactic measure in an undertaking much in excess of the usual estimate of the character of operations necessary. Perhaps the most valuable result of the Mian Mir operations was that they gave an insight into the difficulties which are almost certainly to be encounterd in most really malarious places. They found *Anopheles* breeding places much more numerous than would be gathered from most accounts of operations, and the difficulty of keeping up with the everchanging situation of breeding places under different degrees of rainfall was very great. They found that they had to deal with breeding places under different degrees of rainfall was very destruction was utterly futile. They encountered enormous changes in the facilities for breeding places in the rains, and had to count upon, what appears to have been the main factor causing our want of success, an infiltration of adults from outside the area which could not be prevented by any means in their power. In chronicling their want of ready success we fully realize the inadvisability of damping enterprise by the suggestion of possible failure. But if in the near future they are really to reduce malaria in the tropical possessions, something more must be done than merely to popularize the idea of anti-malarial measures. That malaria will be reduced and in a manner much more direct than by blind schemes of drainage, there is no reason to doubt. Little good, however, seems likely to result from proclaiming a successful issue, the evidence for which will not bear criticism.

Before concluding they called attention to certain points which seem to us of importance. (1) It is easy enough to destroy larvæ in millions and to do away with hundreds of breeding places. It by no means follows that malaria is diminished or adult *Anopheles* banished, and the success of operations on a large scale is still very doubtful. (2) The idea that by destroying breeding places around a barracks, prison, or other building, a reduction in malaria is likely to result requires more critical work before it can be accepted. (3) The occasionally-reported results where a brigade has rid a town of malaria they have no hesitation in challenging as absurd. They are by no means so certain that the number of *Culex* and *Stegomyia* may not be very considerably affected by such means. (4) The use of "admission returns" of all kinds as evidence is a miserable method of proof, and the insignificant factors which greatly influence all such figures make them quite valueless for the purpose of estimating the effect of operations. The only really satisfactory test of success is a reduction of the endemic percentage of infection. In this connection they recommend isolated bazaars and villages as more suitable in the present state of our knowledge for trial experiments than large tropical towns. (5) In any attempt to show a reduction in the number of *Anopheles* it is necessary to recognize that it is easy to delude oneself with their apparent absence, since they are always difficult of detection, and, except in certain places and in certain times of the year, would, as a rule, be considered absent by an observer imperfectly acquainted with their habits. (6) Mosquito operations reports are often extremely uncritical and often ridiculous, since they claim an amount of success for which they have no evidence.

(To be Continued.)

BOOKS RECEIVED.

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THE HUMAN STERNUM. By Dr. Andrew Melville Paterson. 8vo, 89 pages. Illustrated. University Press, Liverpool.

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STATE BOARD OF HEALTH OF MASSACHUSETTS. Thirty-third Annual Report. 8vo, 615 pages. Wright & Potter Printing Co., Boston.

THE STUDENT'S HANDBOOK OF SURGICAL OPERATIONS. By Sir Frederick Treves. 12mo, 486 pages. Illustrated. W. T. Keener & Co., Chicago.

TEXT-BOOK OF ALKALOIDAL THERAPEUTICS. By Drs. W. F. Waugh and W. C. Abbott. 12mo, 405 pages. Clinic Publishing Co., Chicago.